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Contractors and Engineers Monthly

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Vol. 36, No. 4 APRIL, 1939 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Protecting Submerged Piles**
  A novel and interesting method of protecting submerged piles against attacks by Limnoria, a type of marine parasite, by placing concrete jackets around the submerged sections of the piles was used successfully on a wooden bridge on U. S. 17 south of Brunswick, Ga.
  See page 2.

- **Paving at N. Y. Fair Site**
  The millions of visitors anticipated at the New York's World Fair will give little thought to the more than a million yards of paving in roads, parking areas, sidewalks and floors, except to be glad that they are there. The reasons for the choice of types of paving and some of the construction problems, due to the special conditions of limited time and frenzied construction activity all over the Fair site, are described in this issue.
  See page 2.

- **Georgia Speeds Crack Filling**
  What might be termed a "crack" crew has achieved considerable speed and efficiency in repairing the cracks in concrete highways in Division 6 of the Georgia State Highway Department.
  See page 7.

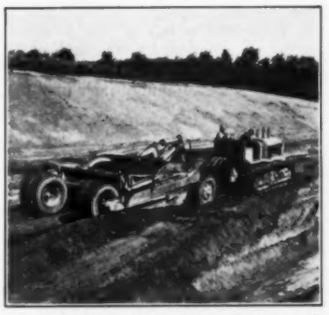
- **Gila River Siphon**
  Apparently the answer to "When is a river not a river?" is "When it's in Arizona," for the contractor for a monolithic concrete siphon under the Gila River, where the main canal of the Gila irrigation project crosses the stream, found no river there. The features of the job are described in this issue.
  See page 8.

- **Alabama Stabilizes Road Bases**
  A carefully stabilized base for a 22-foot double bituminous surface treatment featured the reconstruction of 6.35 miles of highway between Harpersville and Childersburg, Ala., last summer.
  See page 15.

- **Combined River and RR Crossing**
  Details of the work on an overpass carrying U. S. 3 and N. H. 25 over the railroad and a river, and the novel concrete plant set-up for the single river pier are described in this issue.
  See page 25.

IN THIS ISSUE

Bituminous Paving	2, 15
Bridge Construction	25
Bridge Maintenance	2
Cartoon	4
Concrete Paving	1
County Road Work	1
Dam Construction	4, 20
Dredging	31
Editorial	4
Equipment Maintenance	12, 31
Highway Maintenance	7
Picks and Shovels	21
Roadside Development	4, 21
Safety	4
Siphon Construction	8
Stabilized Roads	15
Wisconsin Road Work	1



An Allis-Chalmers Model L Tractor and Gar Wood L-10 Scraper, Owned by Wm. Kimmes of Superior, Wis., Working on a 188,000-Yard Road Grading Job Between Shell Lake and Spooner in Wisconsin

1938 Road Work In Wisconsin

Accomplishments Include Modernization for Today's Traffic Needs As Well As Aid in Snow Removal

✦ THE state trunk highway system of Wisconsin comprises 10,000 miles of main highways and 364 miles of connecting streets; 4,450 miles of these highways are paved with concrete while 225 miles of the connecting streets are surfaced in the same way. The balance of the system is surfaced with bituminous paving, gravel or crushed stone.

Complete figures on the 1938 program have been compiled and the information shows several interesting

(Concluded on page 17)

Novel Plant Set-Up Furnished Concrete For Base Widening

Concrete Purchased in Place for Sheet Asphalt Resurfacing Job Near Columbia, S. C.

✦ AS part of its program for improving arterial highways, the South Carolina State Highway Department widened 16.689 miles of old concrete pavement on U.S. 76 northwest of Columbia, S.C., last summer with a variable-width concrete strip on either side, a concrete leveling course on super-elevated curves, and surfaced the modernized highway with sheet asphalt. The general contract was awarded to The Wesco Co. of Chattanooga, Tenn., which purchased ready-mixed concrete from the Concrete Construction & Supply Co. of Columbia, S.C.

Outline of Project

The old concrete pavement was 16 feet wide, made in 1921 and 1922 on a flat subgrade and with a 6-8-6-inch section. This was widened approximately 3 feet on either side. The widening trench was cored out with Caterpillar and Allis-Chalmers motor patrols with 54-inch blades bolted to the centers of the patrol blades and extending 8 inches below the patrol blades. The trenches were cut to a depth of 8¾ inches below established header grades; however, on the outside of super-elevated curves, it was necessary to build up the widened section to obtain this 8¾ inches. The trenches were not rolled unless backfilled at least 1 inch. They were, however, hand-tamped for the entire length of the job.

The engineers set blue tops every 25 feet so that the trench cuts were made by the patrol graders within ¼ inch of grade. The new roadway was given a crown of 2 inches in its 22-foot width except on elevated curves which were laid flat. Wherever the old flat curves were super-elevated, concrete was used as the leveling course where the thickness was 3 inches or more. The binder-course material from Wesco's Simplicity System hot-mix plant was used where the leveling course was less than 3 inches. The concrete widening strip included 9-inch headers poured 1¾ inches higher than the concrete widening strip itself.

In order to control future possible cracks in the sheet-asphalt top, all of the concrete leveling course was poured so that the edge of the concrete at the minimum thickness would be parallel to the center line of the pavement. Thus, if cracks do occur at a later date, they will not inconvenience traffic.

Only 10 per cent of the entire project was re-location, the major portion being at the east end where several bad curves were eliminated by a deep cut. In this section a 40-foot road with curb, gutter and sidewalk was laid for a distance of 3,500 feet. The concrete base for the sheet-asphalt top is 6 inches thick and carries a 1-inch minimum binder and 1 inch of sheet asphalt.

Concrete Batching Plant

The concrete producer used three set-ups for his batching plant on this job.

(Concluded on page 12)

C. & E. M. Photo
Unloading the Subcontractor's Weighing Batcher at the Second Set-Up for a Road Widening Job Near Columbia, S. C.

Bond Issue Projects On County Highways

J. K. Merrin, County Engr. Of Hillsborough County, Florida, Describes Its Large Program

✦ WITH an area of 1,067 square miles, 700 miles of paved county roads under maintenance, and 600 miles of unpaved roads, County Engineer J. K. Merrin feels that this Florida County, of which Tampa is the county seat, has a real job and is handling it well through the five Commissioner Divisions and the centralized construction organization. The Commissioners handle all maintenance within their divisions and also pick the WPA projects to be handled by the County Engineer who is in charge of construction and who acts in an advisory capacity on any special maintenance problems.

County road work is financed by an ad valorem tax on real estate only. A total of $45,000 was expended by the county during the past fiscal year for materials and about $60,000 for equipment rentals under a $500,000 WPA program for county betterment.

Equipment

Hillsborough County has a County Road Superintendent who is in charge of a county-wide crew for construction and emergency maintenance and repair work. The county owns the following equipment which is maintained for the use of the construction crew and is allotted to the various districts as required: one ½-yard Bay City dragline with International diesel engine, one 800-gallon Kinney bituminous distributor, one T40 International Trac-TracTor, three W30 International wheel tractors, one Adams leaning-wheel grader with 10-foot blade, two Buffalo-

(Concluded on page 23)

Limnoria-Infested Piles Jacketed with Concrete

Hay Method Reinforces And Protects Bridges And Other Structures Attacked by Parasites

(Photo on page 44)

✦ WOODEN piles which have become riddled by the borings of Limnoria, a type of marine parasite which attacks submerged wood, may be strengthened, or piles exposed to the attack of these parasites may be protected by the patented Hay method of pile reclamation and protection. This system has been used successfully along the Atlantic Coast in the protection of piles under wharves without the need of tearing up flooring, as all the work is done from lighters floated up to the job.

An interesting example of the use of this method of protection for wooden bridge piles is the work completed last year on the Turtle River Bridge on the Coastal Highway, U.S. 17, south of Brunswick, Ga., which had become somewhat weakened by the attacks of Limnoria on the creosoted piles. A contract was awarded by the State Highway Department to the Coastal Contracting Co. of Charleston, S. C., for cleaning the 696 piles and jacketing them with a minimum of 3 inches of concrete from 3 feet below mean low water to 6 feet above by the Hay method.

Cleaning the Piles

With ordinary spades and shovels the marine growth of barnacles and oyster shells was removed from the piles and the sway bracing taken off to permit placing the forms for the concrete jackets. All perforated wood was removed by hatchets. As the work was all done from small 5 x 16-foot lighters so as not to interfere with bridge traffic, the hours of work were somewhat regulated by the tides and the winds. In exceedingly windy weather it was necessary to suspend operations, particularly the placing of the concrete jacket. Work was started early in the morning when the tide was approaching low and was suspended as it became high. Following the tides, work was started later each day and when the light was good was continued as late as 7 in the evening.

It was found on the Turtle River Bridge that the Limnoria made their first attacks on the creosoted piles where the sway braces were bolted to the piles. These braces were all below high water, giving the marine borers the maximum of time for their attacks which extended the full distance from high to low tide which is 7.6 feet normal and 11 feet extreme. The Limnoria did not attack the pile below mean low water nor above 5 feet 6 inches above mean low water. The jacket was placed 3 feet below mean low water so that the bottom would be 1 foot below the water at extreme low tide so the Limnoria could not attack the pile when the food supply was cut off above.

C. & E. M. Photo

A Half Section of the Form for Pouring a Concrete Jacket on a Weakened Pile, With the False Bottom in Place

The Forms

The forms used for the encircling of the wood piles were novel in construction and use. They were semi-circular and of varying lengths so as to permit their use on short piles but the standard length was 4½ feet. They were made of sheet steel in four sizes for use on 12, 16, 20 and 24-inch piles. The forms were flanged inward on the bottom of the bottom form and outward for all the others to permit bolting together.

The inside flange at the bottom held the "false bottom," a unique device built on the job to hold the concrete from running out the bottom of the form and also keeping the concrete snug against any large holes in the piles. These false bottoms were cut from flat sheets of 24-gage sheet steel and, when completed, looked like a metal sombrero. They were turned up around the edge to fit snugly against the form, and wedge-shaped prongs at the center pressed against the pile as the concrete was poured so that a tight jacket was always placed against the pile. On the inside of the bottom forms, a latch consisting of a ½-inch square rod welded to the form about 4 inches from the bottom prevented the false bottom from rising because of pressure of water against it before the concrete was placed. The false bottoms were cut from the sheets with Stanley electric shears operated from a 110-volt lighting circuit.

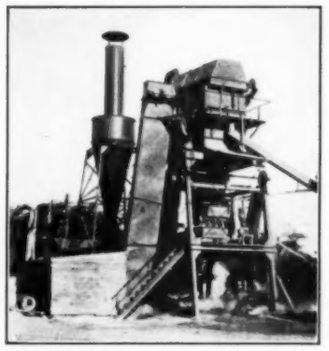
Great care was taken in placing the forms and holding them in place and preventing the lighter from hitting them and damaging the false bottom. The forms were placed above water and then slid down the piles as the concrete was placed. They were centered on the piles at the top of the jacket by means of wooden blocks, and at the bottom by the inside flange of the form, to insure the minimum 3-inch jacket.

Concreting

A 1-bag Jaeger mixer was set up at one end of the bridge where it was convenient to establish small stockpiles, was close to the storage yard for the forms and adjacent to the work shed where the false bottoms were cut and the Atlas cement stored. From the mixer a narrow runway was built out into the water for about 150 feet for the use of the men and for wheeling out the concrete in wheelbarrows to the lighters.

Five men made up the shore crew, two wheeling aggregates to the mixer and two wheeling the concrete from the mixer to the lighters. The mixer man

(Concluded on page 24)



C. & E. M. Photo

The Well-Maintained Hot-Mix Plant of M. F. Roach & Sons at Eastham, Mass.

A New Short Link Paved on Cape Cod

M. F. Roach & Sons Beat Deadline on Bituminous Concrete Surface, B. M. A. Base on Eastham Cut-Off

✦ CONTINUING its program of highway improvement in the national playground area of Cape Cod, the Massachusetts Department of Public Works added a short but important link near the Atlantic end of U. S. 6 last summer. At Eastham, near the junction of Mass. 28 and U. S. 6, an 0.43-mile cut-off was completed by M. F. Roach & Sons of East Bridgewater, Mass.

This short contract of 40-foot roadway is beyond a 3-mile section from Orleans to Eastham completed the previous year by the same contractor. Work on the cut-off was started April 8, 1938, and the bituminous concrete surface had to be completed and open to traffic July 2, 1938. The contractor beat the deadline in spite of the wettest spring in a decade. He was fortunate in the character of the "hardening" secured to stabilize the sand subgrade.

"Hardening" is a Bay State term for a mixture of loam, sand and small stone found just below the sod on Cape Cod farms. This material, when mixed with the sand subgrade, stabilizes the sand so that the crushed stone aggregate of the base does not work down into the subgrade. On this job the stabilizing material had a high per cent of sand and small stones and just the right amount of loam to act as a binder.

The Base Course

Another feature of the work that permitted the contractor to make good time was that only 900 feet of the work was on the old road which was kept open to traffic. This left the balance for the use of the contractor's trucks and for work without interference from traffic.

(Concluded on page 10)

World's Fair Paving Presented Problems

Reasons for Choice and Methods of Construction Of Over 1,000,000 Yards Of Paving at N. Y. Site

By HENRY WELLES DURHAM, Paving Engineer, New York World's Fair 1939

(Photo on page 44)

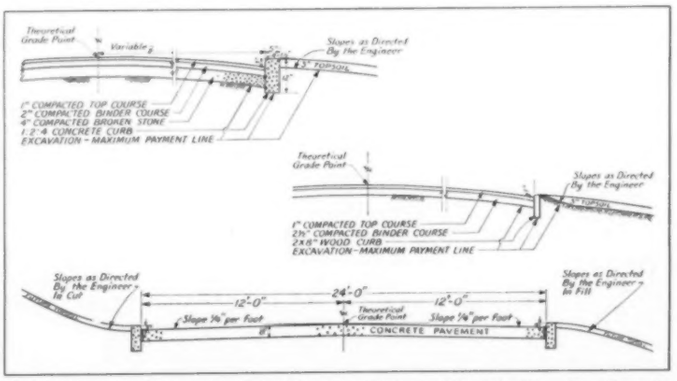
✦ THE problem of paving streets and walks for the New York World's Fair 1939 was unique, due to the peculiar nature of the site chosen. The area which is being utilized for the Fair and which will afterward remain as Flushing Meadow Park, comprising an area of over 1,200 acres in the borough of Queens, consists of a large part of the former alluvial deposit which included Flushing River and the salt marshes through which it flowed to the head of Flushing Bay: an area roughly triangular in shape and bounded by the higher territory of Flushing to the east, Corona to the westward and Forest Hills and Kew Gardens to the south.

From the beginning of the century until the initiation of the Fair and Park projects, much of this area was utilized for the disposal of ashes and garbage brought in by scows and unloaded and piled on the surface. The total amount of material so disposed amounted to 50,000,000 cubic yards. Some of the piles were 90 feet in height and had settled in the silt underlying the meadow mat to a maximum depth of 40 feet.

The improvement of this region was first suggested when it became necessary to connect the Triborough Bridge with the Grand Central Parkway, and territory was acquired for this road along the westerly portion of Flushing Meadow. The plan of the site for the World's Fair project was made jointly by the Park Department of New York City and the World's Fair Corp. Surface grades were adopted whereby the basic outline required for the World's Fair was coordinated and fitted with a plan for a permanent park to remain after the Fair has closed.

Work commenced in the summer of 1936. In a period of nine months, 7,000,000 cubic yards of ashes and meadow mat were moved from the mounds and distributed as fill in the low portions of the area. The old creek bed was filled in, two shallow channels and lakes were dredged, and construction started on a tide gate and dam across the head of Flushing River adjacent to the Long Island Railroad to prevent the inflow of salt water and the fluctuation of tides into the new fresh-water drainage basin. In order to prevent sudden changes in the fresh-water level of park lakes, intercepting sewers were built to take all run-off from exterior areas.

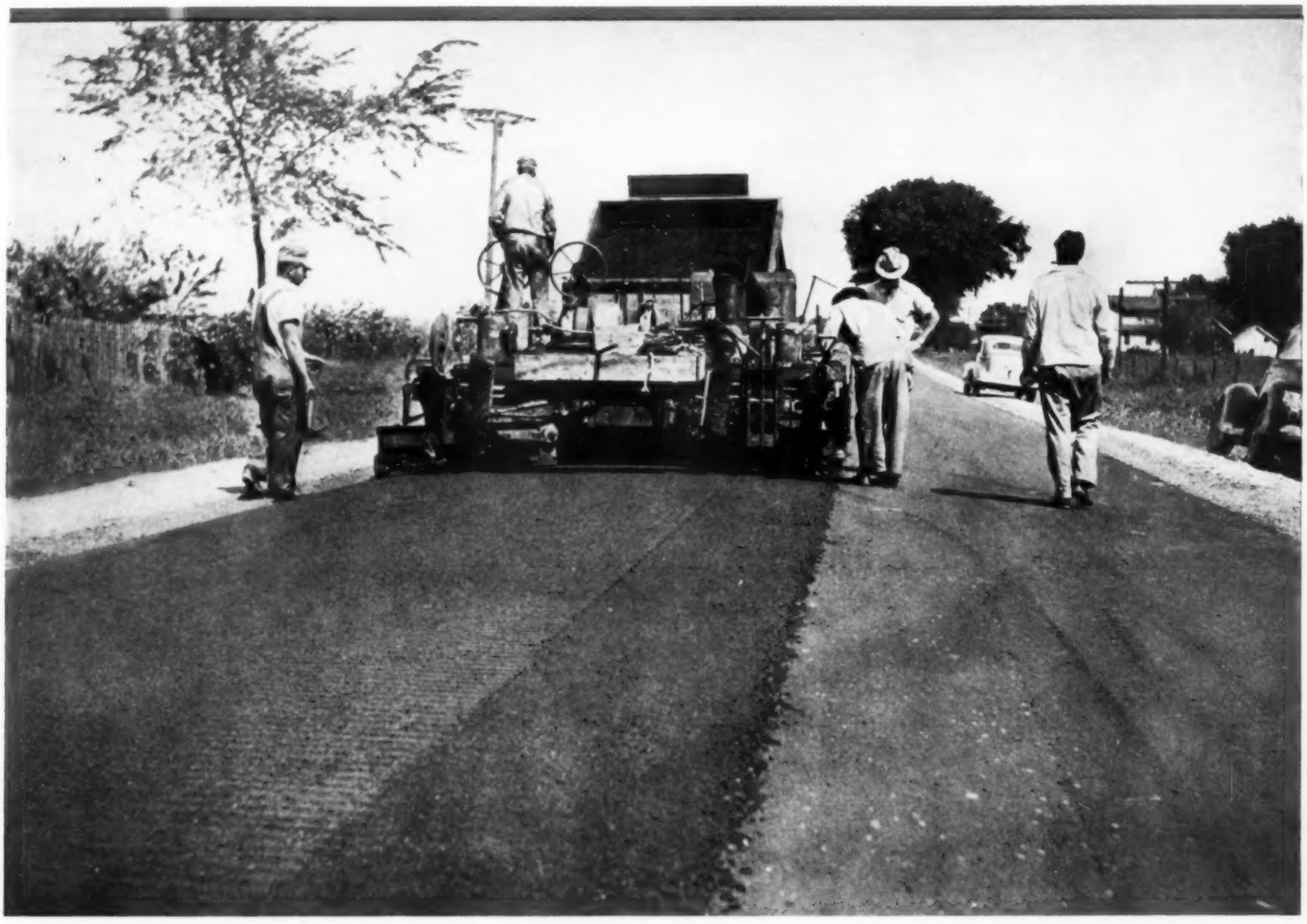
(Continued on page 18)



Typical Cross Sections of Paving at the New York World's Fair Site. Top, Type A Bituminous Pavement; Middle, Type B Bituminous Pavement; Bottom, Concrete Paving for Bus Road Adjacent to Grand Central Parkway

TWO FACTORS PLAY LEADING ROLES IN GIVING YOU

ASPHALT ROADS AT THEIR BEST



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(1) Employ modern methods and equipment, which not only speed the paving operation, but improve the quality of the surface obtained.

(2) Use an Asphalt with a 33-year background, TEXACO Asphalt, which contractors have selected for thousands of miles of America's streets and roads from the Atlantic to the Rockies.

Whether your interest in roads and streets is that of an engineer or a contractor, make it a point always to "Talk Asphalt with TEXACO!"

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Joint Safety Efforts Can Secure Lower Compensation Rates

By S. E. ANDERSON,

Safety Engineer, Harrison Construction Co., Pittsburgh, Pa.; Vice-Chairman for Highway Construction, Construction Section, National Safety Council

Accident prevention in highway construction presents a problem somewhat different from that of the ordinary industrial plant. The large labor turnover, necessitating the hiring of inexperienced workmen, the rapid-fire conditions under which the men must work and handle heavy materials, the ever present hazard of working in trench excavations, the transportation and use of high explosives, the necessity for men to work where heavy traffic is maintained, and selling "old-time" construction men on new safety ideas all make accident prevention on highway work an ever changing problem.

It is difficult to convince contractors of the importance of accident prevention, because it seems at the time that over-attention to this would possibly slow down production. But in the long run it really proves economical.

One of the least realized aspects of compensation insurance is that the rates paid for compensation insurance coverage are assessed on the basis of the contractor's past accident experience. That is to say, the rates are made as a result of the value of the claims made on the insurance company to pay for the accidents occurring to the employees of that company. When it becomes impressed on the contractor that no accidents means low rates and a careless disregard for accident prevention means high rates, then and only then will a noticeable decrease in rates be apparent. This is not only applicable to the large operator, but it is also true of the small contractor, as each pays his premiums on the basis of his payroll totals.

Accident prevention has been advocated for many years, and employers in other fields have long realized that low compensation rates and the happiness and contentment of their employees means cash in the bank to them. Employers in the contracting business should not lag behind in this movement because it will mean increased production and increased profits for them. One careless operator in a group of safety-conscious employers can counteract to a large degree the good which the latter are trying to do. It is therefore necessary for practical action that all contractors, notwithstanding their sphere or the extent of their operations, concentrate on the elimination of employment risks in order that all may benefit.

Some contractors, perhaps, will say that an accident is nothing out of the ordinary, that such things come in the stride of work, or that they expect things of this sort to happen! They are wrong! Accidents shouldn't happen! While the accident involves the employer in no pain or physical loss, and could perhaps be passed over lightly by him for that reason, the pinch will be felt when the insurance company notifies him of an increase in rates.

The fact remains that if the contractors who are safety minded are to put across their crusade against accidents and high compensation costs, they must have the aid and support of those companies who are not now interested, because no matter what the scope of their work may be, it is imperative that all contractors bind themselves together to reduce their accidents and present compensation rates. One contractor can reduce his own individual rate, but for the manual rate to be favorably affected, all contractors must fight together as one—not individually, but as a group.

All employers of labor must realize that their own accident experience can be improved, that every improvement means added profits, and that accidents cost them a terrific sum in hard cash which is hard to locate. You contractors should know that you set your own rates and you should set them right.

Good Roads Pay Dividends

Good safe highways and attractive roadsides help to "sell a state" and are an important factor in bringing visitors and their money into the state.

Minnesota's tourist business, which could not exist without good roads, pays enormous dividends on the state's trunk highway investment, according to a report from the Minnesota Highway Department. The state's tourist industry is variously estimated at an annual value of from $80,000,000 to $125,000,000.

Committee Reports On Paving Materials

One of the important actions approved by Committee D-4 on Road and Paving Materials during Committee Week of the American Society for Testing Materials was the recommendation involving a new method of test for determining the particle-size distribution of fine and coarse aggregates, using sieves with square openings, to be published as tentative. Although the method is also applicable to the use of laboratory screens with round openings, it is not intended for use in the sieve analysis of aggregates recovered from bituminous mixtures. This proposed standard was prepared by a joint conference committee representing Committee C-9 on Concrete and Concrete Aggregates and Committee D-4 under the chairmanship of E. F. Kelly, Chief of the Division of Tests of the U. S. Bureau of Public Roads, and is intended to replace four existing standard methods covering the mechanical analysis of aggregates and designated as C41, D7, D18 and D19.

The subcommittee on tar products presented proposed new tentative specifications for tar which include detailed purchase requirements for fourteen grades of tar used in road construction as priming coat; priming coat and surface treatment; surface treatment and road mix; surface treatment, road mix, premix and seal coat; surface treatment, premix, seal coat, penetration and crack filler; surface treatment, road mix and premix, when low temperature application and quick setting are desired.

The subcommittee on waterbound and traffic-bound roads presented two new proposed tentative specifications covering respectively crushed stone and crushed slag for waterbound base and surface course. The group concerned with bituminous macadam surfaces and bases submitted to the committee two new tentative specifications for crushed stone and crushed slag, respectively, intended for bituminous macadam base and surface course. Two new specifications for crushed slag and for crushed stone, respectively, for bituminous concrete base and surface courses were reported by the subcommittee on hot-mix bituminous surfaces and bases.

As a result of the cooperative studies carried on during the year, the committee has prepared several revisions of the tentative method of test for abrasion of coarse aggregate by the use of the Los Angeles machine. The committee accepted for publication as tentative several proposed revisions in the standard method of test for ductility of bituminous materials which will be published during the year. The tentative revisions of the Standard Method of Test for Softening Point of Tar Products which have been published during the past year will be recommended in June for adoption as standard by the Society.

Will You Get That D--n Hindu Away From Here, Gus?"

Roadside Development

A subject of increasing importance to highway engineers concerned with both the construction and maintenance of highways is that of roadside development. Of interest to them is the recently published report of the Joint Committee on Roadside Development of the Highway Research Board and the American Association of State Highway Officials, of which H. J. Neale, Landscape Engineer of the Virginia Department of Highways, is Chairman.

In discussing the work of the Committee in his introduction, Mr. Neale points out the conclusion reached by the Committee that developed roadsides make for economy and safety; natural roadsides for beauty. Substantiating this conclusion are reports on slope erosion, education and public relations, zoning, highway types and roadside areas, plant ecology, roadside development economics, treatment of the entire right-of-way, right-of-way maintenance problems, and growing conditions on roadside banks and methods of improving them.

Copies of this report may be secured by interested state and county highway engineers and by highway contractors direct from the Highway Research Board, 2101 Constitution Ave., Washington, D. C. Price: 50 cents.

Roads Open Up New Areas

In view of the rapidity with which highways are being built into the Amazonian forest region east of the Andes, thus opening up vast areas to settlement, the Peruvian Government has created a Bureau of Forest Lands and Colonization, which will be dedicated exclusively to the problems encountered in opening up these hitherto unsettled regions.

TVA'S HIWASSEE DAM

Heavy Construction Equipment and a High Cableway Are Speeding Work on This 1,365-Foot Dam Across the Hiwassee River in the Western North Carolina Mountains. **See Page 20.**

New Bulletin on 40-Volt Hobart Arc Welding Outfit

To introduce the new Hobart 40-volt arc welder, equipped with remote control, the Hobart Bros. Co., Box CE-26, Troy, Ohio, is offering a 30-day trial of this welding outfit on the job, with the privilege of returning it at the end of that period for any reason whatsoever.

A new bulletin, describing this new arc welder and outlining the trial plan, as well as the "pay out of savings" plan, may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

New Catalog on Hose

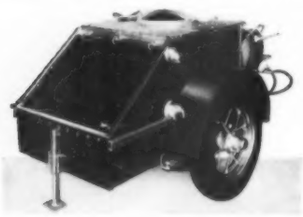
An illustrated catalog has recently been issued by the DeVilbiss Co., Toledo, Ohio, on its complete line of hose, tracing the product from the baled crude rubber through the hose factory and testing laboratory to its various finished forms, including spray-painting hose, air and fluid hose, welding and pneumatic tool hose, and many others. The complete line of hose connections, valves, couplings and adapters is also described. Full specifications are listed, with each type of hose illustrated, and there is information to aid in the selection of the right hose for the particular job.

Copies of this Catalog HD may be secured by writing direct to the manufacturer and mentioning this item.

Cletrac Personnel News

Announcement has been made by the Cleveland Tractor Co., Cleveland, Ohio, of two recent changes in its personnel. Boyce W. Knight, formerly Advertising Manager of the Oliver Farm Equipment Co., has been made Advertising and Sales Promotion Manager for Cletrac and B. T. Eagerton, formerly in charge of sales promotion, has been promoted to the position of Assistant Sales Manager in charge of the Western Division.

BETHLEHEM STEEL
Practices Preparedness, Too!
Purchases 5th Universal-Lorain Truck Crane to Speed U.S. Army Project
This 13-ton Universal-Lorain truck crane of the Bethlehem Steel Company proved its versatility both on land and in the air while handling steel for the U.S. Army's newest and largest airplane hangars at McCord Field, Washington. Traveling speedily from one strategic point to another, this unit, equipped with a 110-ft. boom, set steel weighing from 100 to 15,000 lbs. at heights up to 95 ft.
The 13-ton Universal-Lorain hits a new high in truck crane efficiency with its increased capacities; standard boom equipment up to 80 ft. in length (longer with tip extensions) featuring all-welded construction for greater strength and pin-connected splices for easy assembly; and a steel erector's precision boom hoist with power-controlled boom lowering.
You can't match this 13-ton unit (or any other machine in the Universal-Lorain line) for design and performance because it represents the experience of the manufacturer who 20 years ago pioneered the truck crane and has kept it ahead of the times ever since. Write today for catalog describing Universal-Lorain truck cranes and shovels.
THEW CENTER DRIVE
UNIVERSAL LORAIN
Truck Cranes, 6 1/2 to 13-ton capacity
Truck Shovels, 3/8 to 3/4-yd. capacity
UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO



The New White Combined Tool Heater and Tar Kettle

New Combination Tar Kettle and Tool Heater

Construction and repair work on bituminous pavements usually require the use of an asphalt or tar heating kettle and also some means for heating tampers, smoothing irons or other asphalt tools. A new combination tool heater and tar kettle has just been announced by the White Mfg. Co., Elkhart, Ind.

This combination unit consists of a 50-gallon kettle with a fire-proof top and automatic overflow, together with a tool heating space 32 x 55 inches. Two oil burners furnish the heat for both the kettle and the tools. Fuel is supplied from a 20-gallon detachable tank with a hand air pump. The unit is mounted on a trailer with semi-elliptic springs, Timken-bearing wheels and 6.00 x 16 pneumatic tires. Its weight is 1,000 pounds.

Concrete Vibrator Has Grinder Attachments

The Marvel-Wyco combination concrete vibrator and grinder, recently announced by Concrete Equipment Manufacturers, 80 East Jackson Blvd., Chicago, Ill., is available in vibrator sizes of 1⅝, 2⅜, 3 and 3½-inch, with grinder attachments for the same unit, or as single units to operate at such speeds as may be required.

The vibrator head is made with a cast alloy steel rotor, scientifically balanced, running in two Norma-Hoffman roller bearings with a third ball bearing acting as a heavy-duty thrust bearing, encased in a hard seamless steel tube housing, sealed against the entry of oil, water or dirt. The vibrator nose is also cast of chrome nickel alloy steel. The life of each head under ordinary working conditions will run as high as 1,200 hours, according to the manufacturer. The Marvel-Wyco is driven by one of the oldest standard makes of flexible shafts, ½-inch in diameter, operating in the Wyco patented housing. Additional shaft extensions in 7-foot lengths can be added up to 42 feet in total length.

The housing is made of a layer of metallic flexible tubing and several layers of four-strand piano mesh wire and raw oil-proof rubber, vulcanized into a unit and interlined with a patented non-metallic innerliner impregnated with graphite to reduce friction and requiring but infrequent lubrication. The shaft is joined with hexagon shaped compensators operating within the casing in a ball bearing. The casings or shaft housings are connected with swivel joints, interchangeable at any position in the line drive.

The Marvel-Wyco Vibrator

Power is furnished by a Lauson or Wisconsin air-cooled engine, or by any standard make of electric motor for operation on ac or dc lines. The power take-off from the engine is through the Wyco jackshaft clutch, a self-clutching double V-belt drive. The power plant is available mounted on a Marvel-Wyco Roll-Easy truck. A stationary model with carrying handles mounted on a swivel base is standard equipment.

New Small Tractor

A new 25-hp tractor, the R2, has been announced by the Caterpillar Tractor Co., Peoria, Ill., for handling light blade graders, small maintenance machines, terracers, roll-over scrapers, road plows, listers, harrows and similar equipment. Designed for economical operation under all conditions, this tractor features an engine with optional fuel systems—high compression for gasoline and moderate for using various grades of tractor fuels.

The 4-cylinder engine has a 3¾-inch bore and 5-inch stroke, with 1,525 rpm. It has a five-bearing crankshaft, replaceable alloy iron cylinder liners and forced-feed lubrication to all working parts. To increase its general working ability, a five-speed transmission is provided. The master clutch is hand operated, and there is a roomy full-upholstered seat for the operator.

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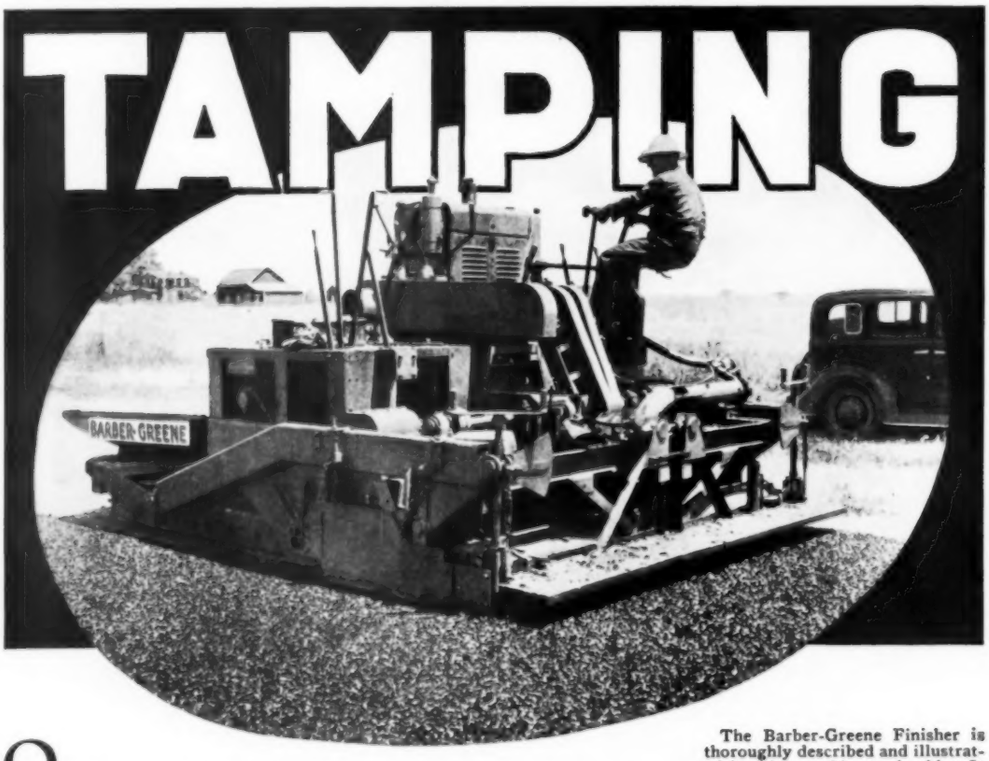
TAMPING



ONLY the Barber-Greene Finisher *Tamps*. Only *Tamping* gives uniform compaction. Only uniform compaction assures a permanently smooth surface.

The ingenious and greatly superior Leveling Principle of the Barber-Greene would be practically worthless without *Tamping*.

The Barber-Greene *Tamps* and Levels simultaneously, automatically compacting more material into the depressions. *Even if forms are specified, Barber-Greene Tamping is essential, if the surface is to stay level under rolling and traffic.*

Tamping allows the Barber-Greene to lay stiffer, less workable mixes. *Tamping* kneads and compresses the material into place. *Tamping* not only compacts, but the vibration interlocks the fine particles. *Tamping* greatly reduces rolling, and eliminates local depressions that the roller bridges. *Tamping* simplifies matching joints, as both the old and the new mats are in their compacted states. *Tamping* is not just a theoretical advantage. Hundreds of miles of work throughout the country prove it—all Barber-Greene owners confirm it. We urge you to ask them. Barber-Greene Company, Aurora, Illinois.

The Barber-Greene Finisher is thoroughly described and illustrated in this new 36 page booklet. It comprehensively covers Principles, Accomplishments, and Important Features. You should add the interesting contents of this booklet to your present knowledge. Write for your copy, there is no obligation.

39-4

• STANDARDIZED MATERIAL HANDLING MACHINES •

C. & E. M. Photo

You Can Make Time Filling Longitudinal Joints

Filling Cracks In Division Six

A Small Motorized Outfit Maintains Concrete Roads In Georgia at Rate of 1½ Miles a Day

(*Photo on page 44*)

✦ SIX men and a truck instead of the famous "Three Men on a Horse" do a fine job in repairing the cracks in the roads of Division 6 of the Georgia State Highway Department, with headquarters at Savannah. The outfit consists of a light truck which transports the men and the barrels of asphalt and hauls the small heating kettle. These men average about 1½ miles of pavement a day with a longer turn if the cracks happen to be all longitudinal. They work a uniform 9 hours per day, filling old expansion joints and other transverse cracks as well as the longitudinal cracks. The latter are the easiest to work as the two men with the pouring pots can walk right down the road followed by the easily moved 2-wheel Aeroil 60-gallon kettle moved by one man who feeds the asphalt and tends the kerosene torch for heating the material.

The truck starts out early in the morning with the foreman and five men, carrying six drums of heavy blown asphalt and towing the kettle. A small compressor is usually carried to furnish air for blowing the cracks as clean as possible to insure complete filling.

As soon as the kettle is heated up and the cracks have been cleaned ahead for a sufficient distance, the two men start pouring with the hand pots while a flagman holds up traffic behind them. The flagman's function is not to delay traffic but to slow it up sufficiently to prevent hasty cutting around the men, resulting in possible crashes with on-coming vehicles.

As rapidly as a transverse crack is poured, or about 10 feet of longitudinal crack is filled, the fourth man and the Foreman hand cast sand from the shoulder onto the asphalt before traffic has a chance to pick it up. The kettle man pushes the portable kettle ahead to keep as close to the pouring as possible and the flagman or the Foreman moves the truck ahead on the shoulder.

The Division 6 maintenance crew engaged in this work on U.S. 17 just north of Darien, Ga., when we interviewed them, was in charge of J. E. Pipkin, Foreman. E. A. Logan is Division Engineer and T. D. Lamb, Jr., is Division Maintenance Engineer.

Line and Surface Levels

Sand's-Stevens line and surface level, particularly designed for use by road-building contractors and engineers, is easily and quickly attached to the line and is so made that it can not be accidentally detached from the line. Complete information on this level may be secured direct from the manufacturer, the Sand's Level & Tool Co., 8631 Gratiot Ave., Detroit, Mich.

New 30-Yard Scraper

A new and larger Carryall scraper, the RU 30-yard model, has just been announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif. Inasmuch as a pusher is usually needed to load any scraper over 15 yards capacity, it was decided to take advantage of the latent power in the necessary pusher for loading more pay yards and in the lead tractor for hauling more. Thus, this new scraper is designed to haul still more dirt with the same power.

Features of this new model include the scientifically designed blade to speed up cutting by boiling the dirt into the bowl, the patented sliding bucket which is claimed to reduce tractor effort and increase pay loads, and an improved sheave arrangement to facilitate dumping by handling the heavy load more directly through the cable action transmitted by the power control unit. The unit is mounted on two 24 x 32 pneumatic tires, 80 inches high, on the rear and four 18 x 24 pneumatics on the front.

The heaped capacity of this Carryall is 30 yards and the struck capacity, 22.2. This yardage compares favorably with tandem operation.

Personnel Changes At International Harvester

The International Harvester Co., Chicago, Ill., has announced the retirement of Edward A. Johnston, Vice President in charge of engineering and patents. Mr. Johnston had been with the company for 45 years. A. W. Scarratt, who has been assistant to Mr. Johnston since 1936, will succeed him.

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For All Contractors and Construction Officials

To appreciate the full significance of this simple problem in arithmetic, you should investigate the Jumbo Mixer. There is a difference. Write today for the full story.

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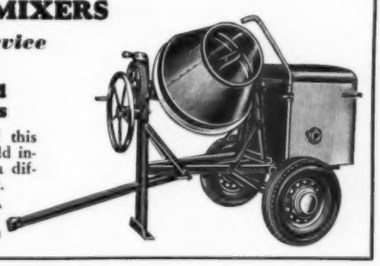
Saginaw, Michigan



Speed-o-Matic
SHOVEL - DRAGLINE - CRANE

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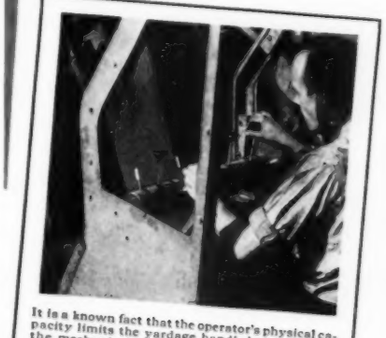

It is a known fact that the operator's physical capacity limits the yardage handled per day, not the mechanical capacity of the machine. Time studies prove that Speed-o-Matic enables the operator to get 25% or more yardage than from the same size machine with manual-lever control.

● When a shovel takes over a tough job and increases yardage-output and reduces cost, such as this K-45 Speed-o-Matic did for A. J. Leaf Co., Utica, N.Y., it deserves the immediate and serious attention of every contractor. It dug into red shale rock and packed-cemented-gravel—swinging and dumping to 8-yd trucks—with a truck loaded every 39 seconds. Such performance is not unusual — it's the kind of performance Speed-o-Matic makes possible anywhere. Its speed, its flexibility and its ability to eliminate "operator fatigue" are all important advantages to help cut costs on any job. Send for catalog.

LINK-BELT COMPANY
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LINK-BELT

Concreting a Siphon Under Dry River Bed

Sheet Pile Cut-Off and Handling of Reinforcing Features of Gila River Job Near Yuma, Ariz.

By JOS. C. COYLE

(*Photo on page 44*)

✦ THERE is normally no surface flow in the Gila River where the gravity main canal of the Gila Project, near Yuma, Arizona, crosses the stream bed. This is partly due to the use of both surface and underground water for irrigation at points further up the river. However, in bidding on the construction of a monolithic concrete siphon, 19 feet 6 inches in diameter and 2,120 feet long, due allowance was made by most bidders for possible "undercover" activities of the upside down stream.

Many construction men believed that the Metropolitan Construction Co. of Los Angeles would be literally "washed up" on the job at its bid of $337,375.50. Nevertheless, the peculiarities of the dry river were judged accurately by the firm which made excellent time on the job. Starting March 2, 1938, the concreting was practically finished in December and the job was completed during January, 1939, although operations were suspended for four months during hot weather.

The dewatering problem caused little concern. Seven 22-inch wells, 50 feet downstream from the center line of the siphon, were used, but only two or three Byron Jackson single-stage high-head pumps were required. These were moved along the line of wells as the work proceeded. When farmers in the nearby South Gila Valley were drawing on the water table for irrigation, only two pumps were needed.

Description of Job

The spring working period was devoted to the construction of the outlet structure and 300 feet of siphon barrel adjoining it, together with excavation and compaction at both outlet and inlet. The siphon barrel is horseshoe shaped on the outside, with a wall thickness of 20 to 28 inches and is 1,922 feet long. The inlet and outlet structures are each 60 feet long, with a closed transition and sloping left wing walls. The right wing walls are vertical to connect with future construction. The inlet also includes a gate section and hoist platform. The present siphon will carry the flow of the recently excavated initial canal which has a bottom width of 22 feet and will carry 13.5 feet of water. Two additional siphons are planned for future development when the canal will be enlarged to a bottom width of 100 feet. Near each end of the siphon, enlargement has been made and embankments completed. Some of this excavation was done under another contract.

Excavation and Embankment

Excavation for the siphon barrel reached a depth of 25 to 35 feet and was about 80 feet across the top. Two 2-yard Koehring draglines were used for various duties about the job. One of them excavated the trench, working first from one berm and then the other, casting most of the spoil upstream as a protection in case of possible flood water. It was assisted by one of the two Caterpillar D8's with a LeTourneau bulldozer which pushed the loose river sand aside. A service road was constructed on the right berm and it and other access roads were sprinkled daily by tank trucks to reduce the dust.

Near the inlet, an embankment on the right of the ultimate channel of the canal has a top width of 30 feet and an inside slope of 1½ to 1. The outside slope of 2 to 1 is covered with riprap at a 3 to 1 slope, 3 feet thick at the top edge. On the inside slope a compacted lining, 8 feet thick at the top and with a slope of 2 to 1, is supplemented by a loose fill to bring the bank in to the initial 22-foot canal. Upstream from this, the uncompacted right bank has a similar compacted lining and riprap on the outer slope. Natural earth forms the left canal bank.

For 779 feet from the siphon outlet, excavation of the canal to its ultimate width of 100 feet was included in the contract. From that point to the foothills the canal had been excavated under an earlier contract, including 2 feet of extra depth for a compacted lining and also for embankment toes. This lining was placed by the siphon contractor, using several 6 and 7-yard Mack and Autocar trucks to haul and dump the material in windrows. It was spread in layers a few inches thick by the two Caterpillars with LeTourneau bulldozers. It was then compacted twelve or more times with sheepsfoot rollers.

Pouring the Monolithic Barrel of the Siphon Near the Inlet

For the first 1,700 feet, the banks were stripped by the bulldozers to remove unsuitable material and then fur-

(*Continued on page 26*)

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The truly economical Safety Measure

If you are interested in reducing night traffic accidents we urge you to write at once for complete information on

PRISMO LIFE-LINE ROAD STRIPING and PRISMO-treated Highway Signs

In addition to these time-tested, state- and government-approved methods of cutting down the accident ratio we announce

PRISMO PERMI-BASE

(see illustration below)

in rolls of standard width up to 24" in glistening white or brilliant yellow. Again the Prismo Process has, as with the other spectacular Prismo products, introduced millions of tiny glass spheres in a special binder on a new basic material which is flexible and durable. This product has an all-around use. You can apply it anywhere. Prismo PERMI-BASE has been perfected by outstanding chemists who have also compounded a weather-proof, moisture-proof adhesive for applying it.

Particularly designed for use on obstructions, temporary hazards, posts, abutments, truck bodies, bumpers, railroad gates, etc. It is easy to handle, quick to set permanently, is extremely flexible so that it can be applied to curved or flat surfaces.

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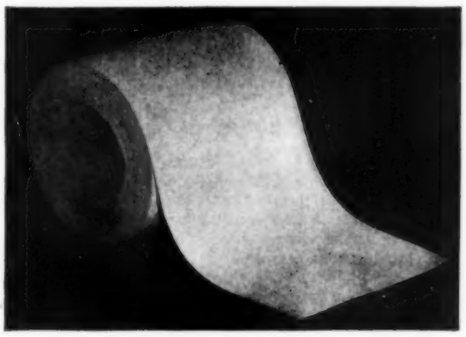

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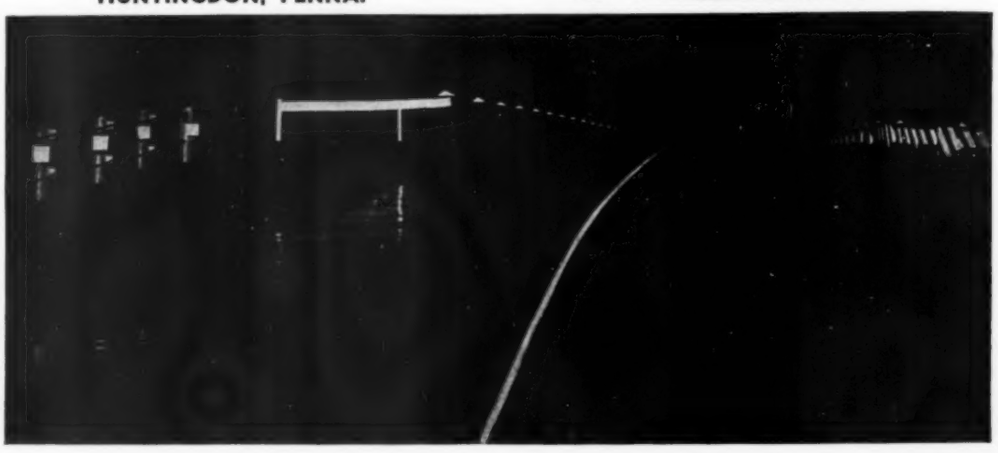

Helm Reelected President By The Asphalt Institute

Joseph S. Helm of the Standard Oil Co. of New Jersey has been reelected President of The Asphalt Institute for the year beginning April 1, 1939. Vice Presidents elected are J. A. Blood of the Standard Oil Co. of California, T. M. Martin of Lion Oil Refining Co. and A. M. Maxwell of Standard Oil Co. of Ohio.

W. H. Kershaw of the Texas Co. was elected Chairman of the Executive Committee, with J. A. Blood, J. S. Helm, T. M. Martin, and David Waxman of the Shell Petroleum Corp. as members. F. V. Widger of the Texas Co. was reelected Secretary and J. E. Pennybacker was reelected Managing Director.

Protective Equipment For Construction Jobs

Four new welding helmets, four new hand shields, and three new face shields for light-duty protection have just been announced by the American Optical Co., Southbridge, Mass. Although not designed to replace goggle protection, the face shields are suitable for use on such operations as metal hand sawing, sanding, and light grinding. These shields are light in weight, and are so made that they may be thrown up when not in use, a friction joint between the shield and the headband holding it firmly in place whether in use or not. They may be worn with or without prescription glasses and are supplied with clear, amber or green windows.

The welding helmets have a new free-floating headgear and an outside friction joint as standard equipment. Three types of glass holders are available: deep-drawn leak-proof steel, improved Bakelite, and the new Dowmetal lift front, all of which assure maximum protection for welding plates and cover glass. The hand shields are made of vulcanized fibre, with a deeply grooved corrugated fibre handle to insure a firm positive grip.

Moss Becomes Director Of Dodge Truck Sales

The appointment of Tom W. Moss as Director of Dodge truck sales to succeed J. D. Burke, who recently resigned, has been announced by the Dodge Division of Chrysler Corp. Mr. Moss for the past five years has been General Service Manager for Chrysler.

"WE SAVE ENOUGH ON FUEL EVERY YEAR TO BUY A NEW PIECE OF EQUIPMENT"

—COUNTY ENGINEER, LINCOLN COUNTY, KANSAS

Lincoln County, Kansas. Part of the county's fleet of "Caterpillar" Diesel Equipment. The machine in the front is a No. 12 Auto Patrol. The second machine is a No. 11. And the other two are No. 10s. In a short day, these four Auto Patrols built 1½ miles of road . . . complete!

Here's a useful, economical, dirt-moving outfit for straightening, realigning, and making cuts and fills on a county's roads. It is a "Caterpillar" Diesel D6 Tractor and a LaPlant-Choate scraper. The operation, here, consists of stripping 20 feet of overburden from a gravel pit in order to obtain road-building material. The overburden is moved 350 feet — at the rate of 50 to 60 yards an hour! The tractor, of course, has many uses in addition to those already mentioned. It can team-up with all sorts of equipment — bulldozers, graders, tampers, etc. — and do an outstanding, economical job!

"Caterpillar" Diesel No. 12 Auto Patrol — owned by Lincoln County, Kansas. Here is a heavy, powerful, fast motor-grader well-suited to a variety of road-construction and road-maintenance work.

LINCOLN COUNTY has the right idea! Make "Caterpillar" Diesels the *backbone* of your road program. Take the money they save on fuel and turn it into *additional*, useful equipment. With the substantial fleet you'll eventually build up, you can recondition your main roads cheaply and quickly when Spring breaks—and still have *time enough* and *funds enough* to improve the secondary roads!

Sooner or later, with the help of "Caterpillar" Diesels, all your roads will be main roads. Watch the respect your county wins then . . . and watch how your county grows!

Following out this scheme of converting fuel-savings into more equipment, Lincoln County already owns a good-sized fleet of "Caterpillar" Diesel Tractors, Graders and Maintainers. Leader of the fleet, at present, is a No. 12 "Caterpillar" Diesel Auto Patrol!

In less than a year, the No. 12 Auto Patrol has made an unusual record for itself throughout the United States and Canada. It is heavier and more powerful than the popular No. 10 and No. 11 Auto Patrols, and can naturally surpass their achievements!

Briefly, the No. 12 gives you a 66-horsepower engine with six forward speeds . . . two-speed power-controls . . . more blade-scope . . . and greater ease and accuracy in steering. It enables you to handle heavy ditch-cuts and high bank-cuts. And you have a full-revolving blade for working in reverse. To all those advantages, of course, you can include the *fuel-economy* that goes with every "Caterpillar" Diesel!

Undoubtedly, this is the ideal machine to use as a basis for a road program similar to Lincoln County's. You'll have a road builder and maintainer, *all in one!* See your "Caterpillar" dealer for more information.

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DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

Bituminous Concrete On Cape Cod Cut-Off

(*Continued from page 2*)

The old road was a bituminous concrete about 4 inches thick on a waterbound-macadam base. This was removed with a 1½-yard Bucyrus-Erie shovel and then the 4 inches of hardening dumped and spread with a bulldozer and hand labor and rolled with a 12-ton Buffalo-Springfield roller.

The base-course stone from 2 to ¾-inch was spread 5 inches thick loose with a Blaw-Knox-Nickerson spreader and rolled to 4 inches compacted with the 12-ton roller. The spreaders were set to 13, 13 and 14 feet widths to give the 40-foot width of the base. This stone was penetrated with 1½ gallons of 85-100 penetration Colonial-Beacon asphalt and immediately rolled with a 3-wheel 12-ton roller. The surface was covered with ½-inch stone at the rate of 22 pounds per square yard by hand casting and then hand-broomed to fill the voids. The original specifications called for 20 pounds of the filler stone but this was increased to 22 when it was found that the surface was still too open for base.

The Surface Course

The bituminous concrete was laid in two courses, a base or binder course, and a top course. The former was 1¼-inch compacted and the top ¾-inch compacted. Both courses were spread with the B-K-Nickerson spreaders in such a way that the joints of the surface and base were broken and did not come over each other. Two rakers followed behind each spreader on each side working mostly on the joints. The binder and top courses were rolled first with a 10-ton Buffalo-Springfield tandem roller and then with a 3-wheel 12-ton roller.

The binder and top courses were checked constantly with a 10-foot straight-edge transversely and a 15-foot straight-edge longitudinally. Most of the surface of the road was warped as there were several reversed banks. The maximum super-elevation is 34 inches on the curve at the east end of the job. The binder course was laid for the entire contract and then the top was spread and rolled.

Sidewalks and Curb

The edge of the roadway is defined by Type C granite curbing set vertically with a rough face front and back and a sawed top. The curbing was in random lengths and thicknesses varying from 3 to 10 feet long and 4½ to 5½ inches thick.

The sidewalks are 5 feet wide and have 4 inches of hardening, 2 inches of penetration macadam and a surface of 1 inch of bituminous concrete. The various courses were rolled with a 3-ton Buffalo-Springfield roller. There is a 2-foot planting strip between the paved sidewalk and the curb.

The Hot-Mix Plant

The contractor used the same hot-mix plant in North Eastham some 3 miles beyond the present job that he used for the paving of the 3-mile job the previous year. The various sizes of stones were delivered by rail from the New Haven Trap Rock Co. and unloaded from the gondola cars by dumping into a pit from which the material was unloaded by a Burch unloader to trucks and hauled to the various stockpiles. Sand was hauled to the plant by truck from a pit about 3 miles distant.

The various aggregates were handled from the stockpiles by a crane with a ¾-yard Blaw-Knox bucket to a steel hopper equipped with a metal conveyor feeder to the bucket elevator of the drier. The Warren Brothers Pacific type drier was 54 inches in diameter and 30 feet long and equipped with three fuel oil burners. Mounted on top of the drier was a cyclone-type dust collector.

The hot elevator carried the materials up to a rotary screen with four sizes and a discard chute. There were four hot-material bins and a separate elevator and screw conveyor to the weigh box for the lime dust. Howe automatic scales were used for weighing the materials, including the asphalt, and a gasoline meter for the Sealdrock patented flux used in the mix. On the plant two men weighed the aggregates and asphalt.

The asphalt was received by tank truck and pumped by a rotary into the 2,000-gallon asphalt-storage tank heated with steam from a vertical boiler which also supplied steam for the mixer gates. The drier was driven by a 30-hp General Electric motor and the plant by a 75-hp Triumph motor. The plant was not called upon to produce to its regular capacity on this job because of the relatively small quantities but on the 3-mile job in 1937, it regularly turned out 800 tons in 10 hours.

A novel item at the plant was the well for supplying boiler feed and drinking water. A 1½-inch well was driven and pumped by a ¼-hp Westinghouse motor across a 500-volt line driving a series of gears to produce a reciprocating motion on the pump piston.

BATCH QUANTITIES IN POUNDS

	Top	Base	Sidewalk
¾-inch stone	——	1,513	——
½-inch stone	1,125	430	423
¼-inch stone	778	160	1,295
Sand	820	750	990
Lime dust	100	——	100
Asphalt	147	117	162
Sealdrock	30	30	30
Batch weight	3,000	3,000	3,000

Personnel

The contract for this 0.43-mile project of 2-inch bituminous concrete top on a 4-inch penetration-macadam base 40 feet wide was awarded to M. F. Roach & Sons of East Bridgewater, Mass., on its low bid of $51,903.70. Michael Roach, Jr., was Superintendent for the contractor and R. E. McCarthy was Resident Engineer for the Massachusetts Department of Public Works.

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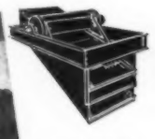
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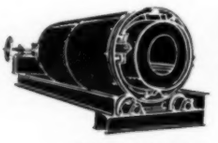
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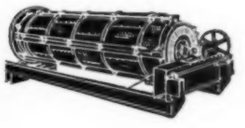
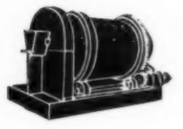

DRY SCREENS

SCREW REWASHERS

LOG WASHERS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Only Telsmith's long and varied experience . . . Telsmith's close contact with plant operators and operating conditions all over the world . . . could produce a line of equipment, crushers to bin gates, *so modern and so complete!*

But even more valuable to you is Telsmith Engineering Service. Telsmith plans your entire plant . . . stationary, semi-portable or portable . . . exactly to suit *your* needs—selects the right machinery . . . synchronizes its operation. Telsmith centralized responsibility produces results! *Get the New Telsmith General Bulletin, B-34.*

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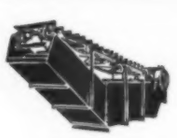
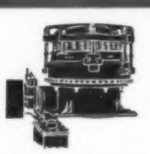
Cable Addresses: Smigworks, Milwaukee — Concrete, London
Associates in Canada: Canadian Vickers, Limited, Montreal and Vancouver
50 Church Street, New York City
713 Commercial Trust Bldg., Philadelphia, Pa.
411 Wellington Bldg., Pittsburgh, Pa.
211 W. Wacker Drive, Chicago, Ill.
81 Binney Street, Cambridge, Mass.
Bendelari, M. & S. Co., Louisville, Ky.

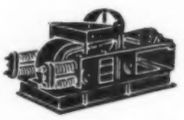
TELSMITH


SAND DRAGS

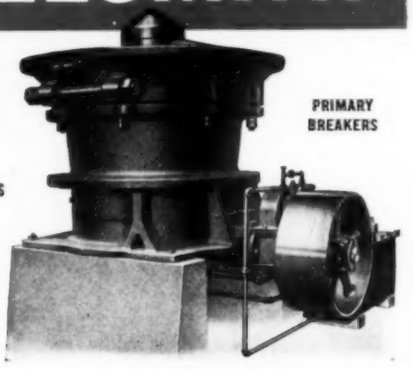

GYRASPHERE CRUSHERS

WHEELING JAW CRUSHERS

ROTARY GRIZZLIES


DOUBLE ROLL CRUSHERS

REDUCTION CRUSHERS


PRIMARY BREAKERS

The New Huber Road Maintainer

New Road Maintainer For Light Road Work

Designed for light road work, the new road maintainer just announced by the Huber Mfg. Co., Marion, Ohio, is based on the same principle of design as the Huber power grader, the blade of the maintainer being pulled bulldozer fashion from the rear, to eliminate frame strains and blade chatter and utilize straight-line power from the rear end to the blade. The 9-foot hydraulically controlled blade is connected to a circular member by means of two heavy blade braces which are held to the member by two heavy pins, making it possible to place the blade at a number of different working angles, either to the right or the left.

Complete information on the Huber mantainer, which when stripped of the blade is a conventional tractor of about 30 hp, may be secured by interested contractors and state and county highway engineers direct from the manufacturer or from this magazine.

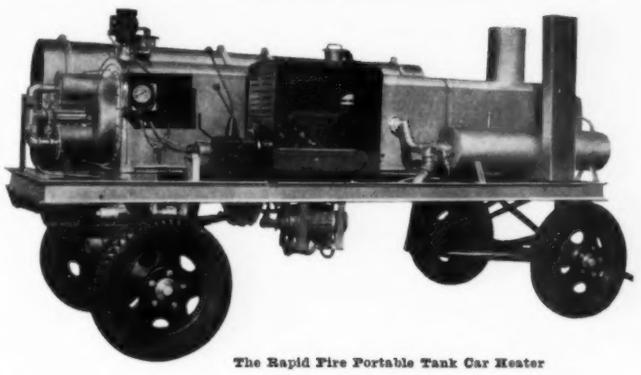
Features of New Tank Car Heater

The Rapid Fire portable tank car heater, made by the W. E. Grace Mfg. Co., 1319 Chestnut St., Dallas, Texas, is designed as a portable self-contained unit which will heat several cars a day.

The burners of the unit are of simple construction, using pressure air from a Victor Acme rotary positive blower, producing an intense heat without smoking, and burning fuel oil, furnace oil or kerosene. Its maximum fuel consumption is about 5 gallons an hour per burner, according to the manufacturer. Dampers permit the regulation of air to each of the three blowers. A three-way valve at the outlet permits loading a distributor or booster tank without shutting down. The dial-type mercury-bulb thermometer in a moisture-proof case is guaranteed accurate within one-half of one per cent and has a scale of 100 to 500 degrees F. It has built-in contact points for operating the solenoid valve in the fuel line to shut off the burners when 400 degrees is reached. A Kinney rotary pump discharges directly into the heater. Housing around the pump, which displaces 120 gallons per minute at 1,800 rpm of the engine, permits the pump to be easily preheated and kept warm by the motor exhaust. The double roller chain drive from the motor is enclosed. The strainer is located just ahead of the pump. A supply of steam at 10 to 60 pounds pressure is available for thawing or cleaning machinery. The steam unit operates independently of the pumping booster.

An important feature of the Rapid Fire Heater is the spiral baffles around which the material is circulated at a rapid rate while heat is applied from both sides. The scouring action reduces coke formation and the spirals also act as fins to assist in heat transfer. The asphalt travels over 125 feet in the heating unit and is exposed to over 300 square feet of heated surface. The heat travels the length of the machine three times and the asphalt four times.

Power is furnished by a 4-cylinder 15-hp Continental industrial engine with magneto, gas, air and oil filters, and governor. The transmission provides a low gear for cold, thick asphalt, an intermediate and high speed for more rapid circulation, and a reverse for draining or pumping hot material into the bottom of the car. Regular equipment also includes one 15 and one 10-foot length of 3-inch flexible metal hose with nipple connections as suction and discharge lines; 25 feet of ¾-inch steam hose with connections; and one No. 4 portable torch-type burner with 15-foot oil hose which connects to the fuel line on the heater and is useful when starting for thawing the tank car outlet and warming the suction line.



The Rapid Fire Portable Tank Car Heater

Literature giving complete specification on these Rapid Fire tank car heaters may be secured direct from the manufacturer by mentioning this item, or from this magazine.

Be sure it's the

GIANTGRIPT STRAIGHTEDGE

Either Steel or Aluminum

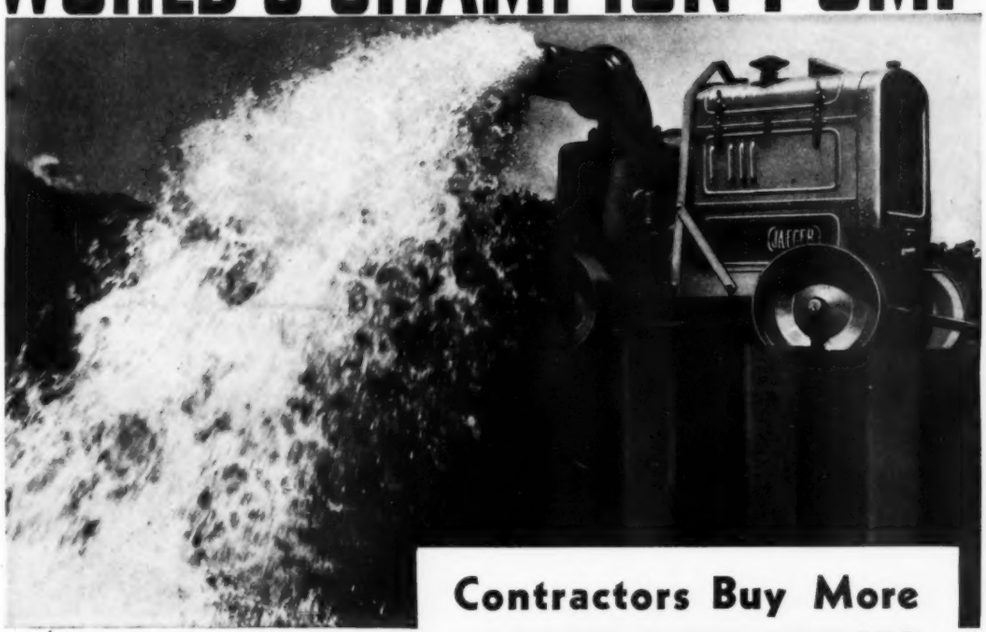
For Checking Concrete Surface

Two useable edges:—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.

ASK YOUR DEALER

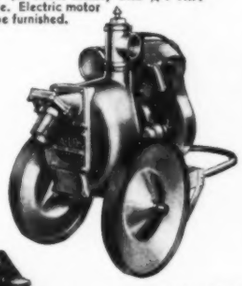
L & M Manufacturing Co.
(Division of Mondie Forge Co.)
10302 BEREA RD., CLEVELAND, OHIO

WORLD'S CHAMPION PUMP



ABOVE: Model 10PH "Sure Prime", 220,000 G.P.H.

World's Champion Bantam Pump — ONLY 52 Lbs.
100% automatic priming, pumps 4000 G.P.H. at 30 ft. head. Aluminum alloy shell. $85 f.o.b. factory with ¾-1 H.P. engine. Electric motor can be furnished.



All sizes 1½" to 10" extremely compact. Up to 6" sizes on 2 wheels.

Self-Priming Dual-Purpose Jetting-Dewatering Pumps: One pump does work of two.

Contractors Buy More JAEGER SURE-PRIMES than Any Other Pumps . .

because: Jaeger gave the world the modern self-priming centrifugal whose small price and huge capacity revolutionized the cost of handling water,

because: Jaeger, alone, has the high velocity "Priming Jet"—30% to 50% faster priming, 100% automatic, 100% sure to prime even at maximum lifts, even (in hi-head models) against vertical heads exceeding 100 ft.,

because: Jaeger's patented Self-Cleaning Shell, Lubri-Seal, pump mounting, shaft and impeller are a marvel of engineering design, consistently delivering ***thousands of extra hours*** of unfailing service without stop or replacement of a single part,

because: every pump Jaeger builds is individually tested for capacity and pressure before it ever leaves the factory.

Our latest Catalog P-39 describes the most complete line of pumps on the market for drainage, supply and well point work. Send for your copy and prices, today.

The Jaeger Machine Co., 701 Dublin Ave., Columbus, O.

WORLD'S LEADING MANUFACTURERS: CONCRETE MIXERS — PUMPS — HOISTS — TOWERS — TRUCK MIXERS — CONCRETE-BITUMINOUS ROAD MACHINERY

Making the Most Of Modern Engines

Good Fuel Necessary to Effective Performance; Careful Engine Check-Ups Mean Greater Efficiency

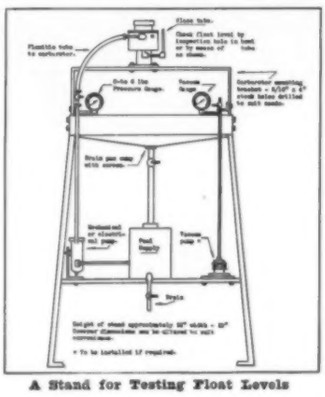
✦ PRACTICAL men are interested in sound methods of obtaining the best fuel economy from their equipment. This cannot be accomplished by the waving of a magic wand or by willful wishing. Its accomplishment is summed up in a knowledge of the equipment with which work must be done, attention to details, and devotion of sufficient time to do the job properly. The net result will pay for itself.

The engine of today's commercial vehicle has become a highly efficient energy medium. It is interesting to note the recent change in commercial engines, with horsepower per cubic inch showing a gain of 85 per cent in 1938 over 1927, while displacement has shown a loss of 15 per cent during this same period.

Engine manufacturers expect their engines to be run on reasonably good fuels and this becomes almost a baseline consideration of any discussion of engine-operating economies. Five important factors to consider when purchasing fuel are: anti-knock value; distillation; volatility; vapor locking tendencies; and cleanliness—gum and water. With the improvements in refining processes which have made possible better fuels and the competition between the various refiners, the buyer today is practically assured of a satisfactory fuel if the better grades of gasoline are secured from a reliable marketer. For this reason the above points, with the exception of anti-knock value, will not be discussed. Gasoline may meet all specifications for a good fuel, but if the anti-knock value is low, it is not suitable for modern high-compression engines.

Many operators are faced with the problem of old and new equipment having different fuel requirements. It is not fair to the new equipment to penalize its chance of maximum operating economies by the use of the wrong fuel. It would seem better practice to modernize the older equipment by changing compression ratios, carburetor settings and spark settings to take advantage of the better fuel needed for the newer equipment.

It is often found that retarding the spark to prevent fuel knock in modern engines reduces fuel economy and power



A Stand for Testing Float Levels

output. When this is noticed, the natural tendency is to advance the spark and tolerate the knock. However, hidden costs not chargeable to the fuel can result from this practice, such as: rapid piston wear or piston burning; breaking of piston ring lands; piston ring sticking; rapid filling of the oil ring grooves; increased oil consumption; and shorter spark plug and exhaust valve life.

Without the proper fuel it is often impossible to effect economies otherwise obtainable. Operators invariably find that the first cost of gasoline does not tell the entire story. Fuels which allow adjustment for maximum power can show savings not only in mileage and maintenance, but in the more important cost per ton-mile. Good maintenance and tune-up start with the fuel.

Testing Carburetors

Carburetors spend money each hour the unit is in service. Should the unit see a large amount of service every day, it is possible for the carburetor to spend more than the unit earns. Fortunately, there is nothing to prevent a reduction in the carburetor's rate of pay and it is possible to effect sensible economies at this point.

Improper maintenance of carburetors usually is caused by three important items: lack of knowledge of the proper functioning of the carburetor; lack of trained men to do the work; and lack of proper test and repair equipment.

The small operator, up to 50 units, might be better served by having the carburetor manufacturer, or a large and well-equipped service branch, inspect and rebuild his carburetors at definite intervals.

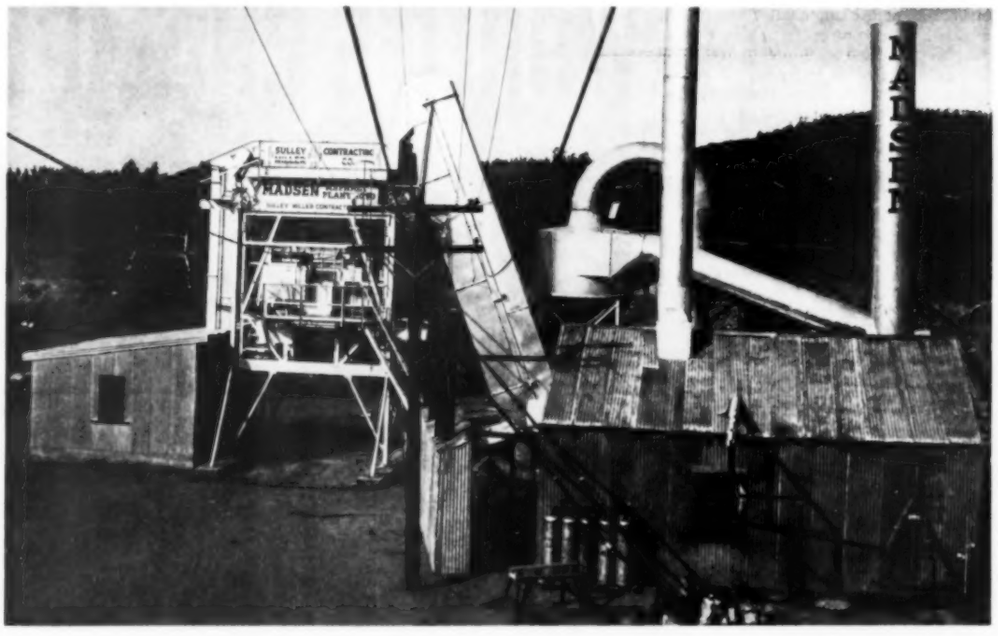
(Continued on page 40)

Do you wish a really superior dumping unit for handling 2-cu. yd. Detachable Buckets?
SEE OUR MODEL LF
(Load Forward)
DEMPSTER DUMPSTER
For any 1½-ton truck
NO COUNTERWEIGHT OVERHANG SIDESWAY
All the load on the chassis
DEMPSTER BROS. INC. Knoxville, Tenn.

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD
ALL STEEL HAND HOIST
SEATTLE, U.S.A.
COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"
Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" ..... 1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price, f.o.b. Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

BEEBE BROS.
2724 6th Ave., So., SEATTLE, WASH.
Warehouse stocks for dealers' Supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.



MADSEN *Asphalt Plants*

MADSEN

Built in sizes ranging from 500 lbs. to 3 tons per batch in both portable and stationary types. Designed from the ground up, each represents a combination of units intended to do a specific job and to do it better. Madsen asphalt plants offer the customer increased value because they are protected by certain patents definitely assuring their leadership in the field. The portable type plant is equipped with the Madsen erection jacks, which may, if desired, be equipped with a single engine which erects the plant by power.

The pug mill embodied in Madsen plants offers the contractor most for his money. Longer-lived wearing sections—a better thrust and sealing collar design at the point where the shafts pass through the end of the mixer body—and a far faster discharge gate which assures more tons per day. Madsen mixers are known for their dependable operation and low maintenance costs—another reason for the outstanding production ability for which Madsen plants have become so justly famous.

An additional production feature on Madsen asphalt plants is the pressure injection method (patented) used for injecting the asphalt into the mixer. By this simple high-pressure pump system, the asphalt is injected into the mixer in approximately 7 seconds, as against 40 seconds required by the gravity flow method used in competitive equipment.

- Asphalt Plants
- Oil Mix Plants
- Pug Mill Mixers
- Aggregate Dryers
- Aggregate Bunkers
- Automatic Batchers
- Concrete Finishers
- Pneumatic-tired Wheelbarrow Wheels
- Madsen Road Pugs

Write for catalogs on any or all of the above products.

Madsen plants are consistent high producers. In the State of California recently a 3,000-lb. Madsen plant produced a tonnage average of 902 tons for 55 consecutive, 8-hour days.

Very nearly 30 years' service to the construction industry in the engineering and manufacturing of asphalt plants, pug mill mixers, aggregate dryers and similar equipment assures you that the Madsen plant you buy is the best equipment of its type available on the market.

MADSEN IRON WORKS
Established 1910
P. O. Box 109 Huntington Park, Calif.

Facts and Formulae For All Engineers

The Second Edition of Professor Ralph G. Hudson's "Engineers' Manual" has just been announced. This handy volume contains the formulae and the constants used in mathematics, mechanics, hydraulics, heat and electricity. Each formula is preceded by a statement in which its application, its symbols and the definite units of measurement are indicated. Final pages of the book are devoted to mathematical tables, properties of materials and conversion factors, all of which are so valuable to the engineer at just the times he needs them.

This Second Edition contains revisions and extensions of all of the tables of physical constants, new steam tables, recomputations of all conversion factors affected by the latest definition of the British Thermal Unit, and enlarged tables of conversion factors and many other additions.

Copies of "The Engineers' Manual" may be secured from John Wiley & Sons, Inc., 440 Fourth Ave., New York City, for $2.75 each.

Panama Highway Progress

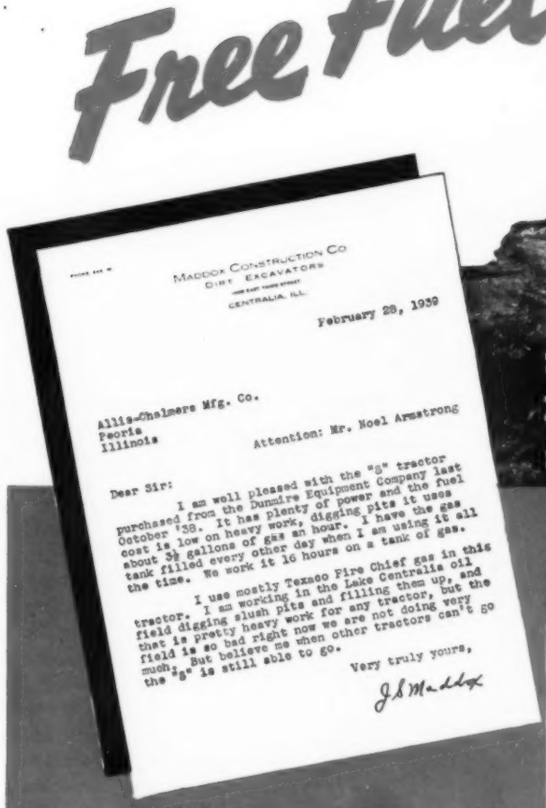
During 1938 the Republic of Panama spent about $1,000,000 on its highway program, including about $60,000 for new machinery and replacements. The bulk of this sum was spent on a 12-mile stretch of the Panama City-David highway, which is a portion of Panama's section of the Inter-American Highway. A new steel bridge was erected across the Platanal River between David and Concepcion. This bridge was one of the projects to which the U. S. Government contributed the steel and the Panamanian Government furnished the labor and local materials.

The U. S. Bureau of Foreign and Domestic Commerce reports that last year the Panama Highway Department purchased one ¾-yard diesel shovel, twelve motor trucks, one 6-yard road scraper, one 60-hp diesel engine and two bulldozers.

Concrete Carts and Barrows

The Sterling No. 3 concrete cart, with 30 or 36-inch diameter wheels with or without pneumatic tires, 6-cubic foot capacity, 14-gage tray, underslung heat-treated axle, and plain or roller bearings, is made by the Sterling Wheelbarrow Co., Milwaukee, Wis. This and other products in the complete line of Sterling wheelbarrows and concrete carts are described in literature which may be secured from the manufacturer.

Free Fuel for a Year!



MADDOX CONSTRUCTION CO
DIRT EXCAVATORS
CENTRALIA, ILL.

February 28, 1939

Allis-Chalmers Mfg. Co.
Peoria
Illinois

Attention: Mr. Noel Armstrong

Dear Sir:

I am well pleased with the "S" tractor purchased from the Dunmire Equipment Company last October 1st. It has plenty of power and the fuel cost is low on heavy work, digging pits it uses about 3½ gallons of gas an hour. I have the gas tank filled every other day when I am using it all the time. We work it 16 hours on a tank of gas.

I use mostly Texaco Fire Chief gas in this tractor. I am working in the Lake Centralia oil field digging slush pits and filling them up, and that is pretty heavy work for any tractor, but the field is so bad right now we are not doing very much. But believe me when other tractors can't go the "S" is still able to go.

Very truly yours,
J. S. Maddox

Saving in First Cost of Model "S", New 64 H.P. Gas Tractor, Is Enough to Buy Fuel for Year's Operation

Take a look at these figures. The price of the gas "S" is $800 below that of any Diesel fuel tractor in the 60-70 H. P. class. Suppose 70 octane gas sells for 15 cents* a gallon. Then:

5,333 gallons
15¢ / $800
Maddox Construction Company (see letter) uses 3½ gallons** per hour
1,523 working hours
3½ / 5,333
1,523 hours = 190 eight-hour days.

YOU GAIN 3 WAYS WITH THE GAS "S"

On Ownership
Lower first cost. Lower insurance rates, interest, taxes and depreciation. Higher trade-in value.

On Operating Costs
Low fuel consumption. No extra-cost, premium lube oils required. New type rollers and front idlers reduce roller lubrication costs from 12c down to as low as 2c per hour.

On Maintenance
Smoother power reduces wear. Gas engine simplicity reduces parts cost. New type rollers and front idlers last longer.

In addition, that lower first cost assures you lower interest, taxes and insurance rates—lower depreciation costs—lower costs per yard of dirt moved. You get a big, fast-moving 64 H. P. tractor that works at speeds up to 6.37 miles per hour—half a mile faster than the next fastest tractor in its power class. And it's a tractor with plenty of power for handling 7 and 8-yard scrapers, 12-foot blade grader, 10-yard wagons, bulldozers, trailbuilders and winches. Gain yourself a year's gas supply NOW. Ask your Allis-Chalmers dealer to demonstrate the Model "S" on your job.

ALLIS-CHALMERS POWER

TRACTORS — IT DOESN'T COST .. it Pays! — ENGINES, ROAD MACHINERY

TRACTOR DIVISION—MILWAUKEE, U.S.A.

* Prices in most states run from 10 to 12c
** Plenty of "S" owners report fuel consumption of 3 gallons and under per hour.

The Kuckenberg Construction Co., of Portland, Ore., Uses This Ford V-8 Tractor-Trailer Unit to Haul Tractors and Other Heavy Construction Machinery to and from Road Jobs. The Unit, with Henry Kuckenberg Beside It, Is Shown Ready to Leave for a Highway Job 35 Miles Back in the Mountains. The Tractor-Truck Is a 157-Inch Wheelbase Chassis with Cab, Equipped with 2-Speed Axle and Auxiliary Transmission.

Vibrating Concrete Aids Contractors

A vibrator does not directly improve concrete, but rather the advantages of vibration are gained indirectly by changing the concrete mixture. Concrete consists of coarse and fine aggregates, cement and water. The ratio of these ingredients is varied according to the results required. As the concrete mixture sets up, a portion of the water hydrates with the cement, while the amount beyond this point evaporates. Honeycombing on the surface and throughout the mass is caused by the evaporation of excess water in a mix.

By cutting down the amount of water in a mixture until it will all hydrate with the cement as it dries and eliminate all evaporation, the mass is made stronger. However, when this is done the mixture becomes so stiff that it is difficult to place in the forms. With a concrete vibrator this stiff batch can be placed efficiently. Further, the mixture can be made cheaper by cutting down the cement content. Since unruly batches can be placed with a vibrator, it is possible to increase the amount of coarse aggregate and decrease the amount of fine aggregate, thus increasing the density of the concrete, furnishing additional strength and greater water tightness which in many types of concrete construction is a most important item. Although vibration greatly improves concrete and reduces the cost of the mixture, there are still other advantages of particular interest to the contractor.

Since it is the contractor's money which pays for a vibrator, he is particularly interested in how it will benefit him. First, placing costs are reduced, as one man with a vibrator can replace from three to eight puddlers. This is in itself quite an item with labor costs at their present level. Second, since the concrete is drier and honeycomb through evaporation has been eliminated, there are fewer voids on the surface of a finished wall, thus reducing the finishing costs. Third, the mixture being poured drier sets up more quickly, making it possible to remove the forms sooner and move them to another location on the job. This cuts down the investment in forms. Fourth, the job progresses faster, thereby eliminating penalties for failure to finish on schedule. Fifth, the concrete, being drier, escapes damage from frost more quickly when work is being done in freezing weather. This serves to cut down heating costs. Thus a vibrator is a lucrative investment for the contractor and sometimes pays for itself twofold on the first job.

A further discussion of this important problem, as well as a tabular presentation of the specifications for Master vibrator hand tools, may be secured from Master Vibrator Co., 100 Davis Ave., Dayton, Ohio, by asking for copies of Forms MV 110 and 111 and mentioning this item.

Use of Calcium Chloride In Portland Cement Mixes

The place of calcium chloride in the concrete field and the results obtained by the proper use of calcium chloride in portland cement concrete mixes for concrete paving, structural concrete and concrete products are discussed in a 48-page booklet "Calcium Chloride and Portland Cement," recently issued by the Solvay Sales Corp., 40 Rector St., New York City. Much of the data contained are taken from reports and tests, and are illustrated with photographs, diagrams and charts.

Copies of this booklet may be secured without charge by interested contractors and engineers direct from the Solvay Sales Corp. by mentioning this item, or from this magazine.

SAVE FOUR DIFFERENT WAYS WITH—

YAUN BETTER BUILT BASKET BUCKETS

1. You use a larger bucket due to the features eliminating weight where not needed.
2. Your pay load is larger, your dead weight is less.
3. Your dumping is quick and complete, no matter how sticky the material.
4. You pay less for maintenance due to patented feature of lip and body that gives strength where needed.

All water is eliminated which gives a dry fill. All suction in bucket eliminated, giving a 100% load.

Write for full profit story of our patented shell and Basket Buckets.

YAUN DRAGLINE BUCKETS & MANUFACTURING PLANT
P. O. Box 39
BATON ROUGE, LOUISIANA

HERE'S THE "LOWDOWN" ON HOW A-W 99's FRONT END CONTROL . . .

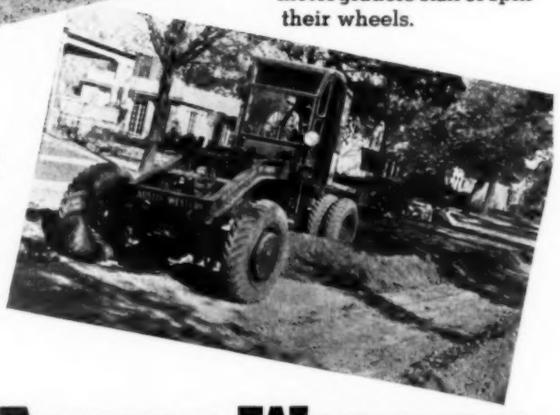
Makes the "Impossible" Jobs Easy . . . Multiplies Motor Grader Usefulness ANYWHERE

● Two outstanding reasons for the "99's" amazing performance record on *"jobs too hot for a motor grader to handle"* are 4-Wheel Drive and 4-Wheel Steer. These distinctive features are responsible for its revolutionary front end control. Wheels no longer side slip. The blade stays where you want it . . . The entire weight of the machine is effectively used to secure traction . . . enables the "99" to wade through blow sand, loose gravel and other obstacles where rear drive motor graders stall or spin their wheels.

Above:
The weight of the heavily loaded blade cannot cause the front end of the "99" to slip or skid. The wheels avoid the loose material in the windrow assuring plenty of traction, plenty of speed.

● ● ●

At Right:
Notice how the operator avoids the windrow with his front wheels while moving a full load on the blade. Grading jobs like this one are easy to handle, and tolerances of an eighth of an inch are easy to secure because of complete control of every working part.



The AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois

Motor Graders
Roll-A-Planes
Rollers
Snow Plows
Crushing and Screening Plants
Washing Plants
Blade Graders
Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders
5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor-Scraper
12-Yard Hydraulic Scraper

Surface Treatment On Stabilized Base

S. R. Batson, Contractor, Built 6.35-Mile Project Between Harpersville and Childersburg, Ala.

✦ IF the care that is being taken today with the construction of our low-cost roads had been used fifteen years ago, this entire country would be in possession of the finest bases for any kind of surface desired instead of having the heritage of the tremendous mileage of poor bases inadequately supporting expensive broken pavements. Alabama, and other southern states, are using what amounts to stage construction on the hundreds of miles of surface-treatment roads now being built on stabilized subgrades with gravel base courses.

Federal-Aid Project 248C, 6.35 miles long between Harpersville and Childersburg, Ala., was built last summer by S. R. Batson of Birmingham, Ala., over an old gravel road with a 28-foot top including shoulders. The new road is 30 feet wide out to out of shoulders with a 22-foot double-bituminous surface treatment on a compacted subgrade and a designed-mix gravel base course primed 23 feet wide. The new road has a 3-foot flat bottom ditch on either side and back slopes varying from 1 to 1 to 4 to 1.

Subgrade and Drainage

The drainage work on the project consisted of extensions of existing box culverts and corrugated cast iron and concrete pipes as well as the widening of the side ditches where the material was used for borrow for the widening of the roadway. In addition the slopes were laid back to secure more material. This work was done with an 8-yard Gar Wood hydraulic scraper pulled by an Allis-Chalmers SO tractor and a 7-yard Continental scraper pulled by another SO tractor. This latter machine was also used to strip the gravel pits for the subgrade stabilizing material and for the gravel base courses.

One unusually sore spot in the subgrade where a spring showed up in the roadway was discovered in time to take care of it before it had softened the new subgrade badly. Two underdrains were put in 3 feet below the base, using 6-inch tile at the bottom of the trench which was 12 inches wide, and then backfilling with 18 inches of 2½ to 1-inch gravel covered with sand. These drains flowed constantly to the ditch.

A 6-foot radius was used in dressing the top of all slopes in cuts and all slopes up to 3 to 1 were cut with the Gar Wood scraper. This was done by running the outside wheel sufficiently over the edge to get a sloping bite into the earth at the edge of the slope. Then this was continued until the slope was the required amount and after that it was easy to run the machine along, cutting the slope back as far as needed. All terrace outlets and ditch checks were sodded to prevent erosion.

On heavy grading where there was a change in the grade a Byers 66 shovel was used, loading to an average of five trucks. In certain locations the high clay content of the subgrade required strengthening and the same material was used as for the gravel base courses. About 16 to 24 yards of the gravel was used per station, depending on the type of clay present in the subgrade. The subgrade treatment extended for a distance of 6,900 feet.

Further grading on the subgrade and the spreading of the subgrade stabilizing material was done with an Allis-Chalmers single-tandem motor patrol and also a Galion hydraulic grader with a 10-foot blade pulled by an A-C SO tractor. The subgrade crown was ⅓ inch per foot for 11 feet either side of the center line and then ¾ inch per foot for the remaining width. This parallels the finished surface of the road. The state requires very close "blue topping" so that the base and surface treatment will not have to take up any inequalities and will be perfectly uniform in thickness. The subgrade was required to be prepared 30 days ahead of the base-course operations to detect any weaknesses of the subgrade under traffic.

C. & E. M. Photo

A Heavy-Duty A-C SO Tractor, Owned by S. R. Batson, Pulled an Athens 16-Disk Harrow to Mix the Proportional Base Materials

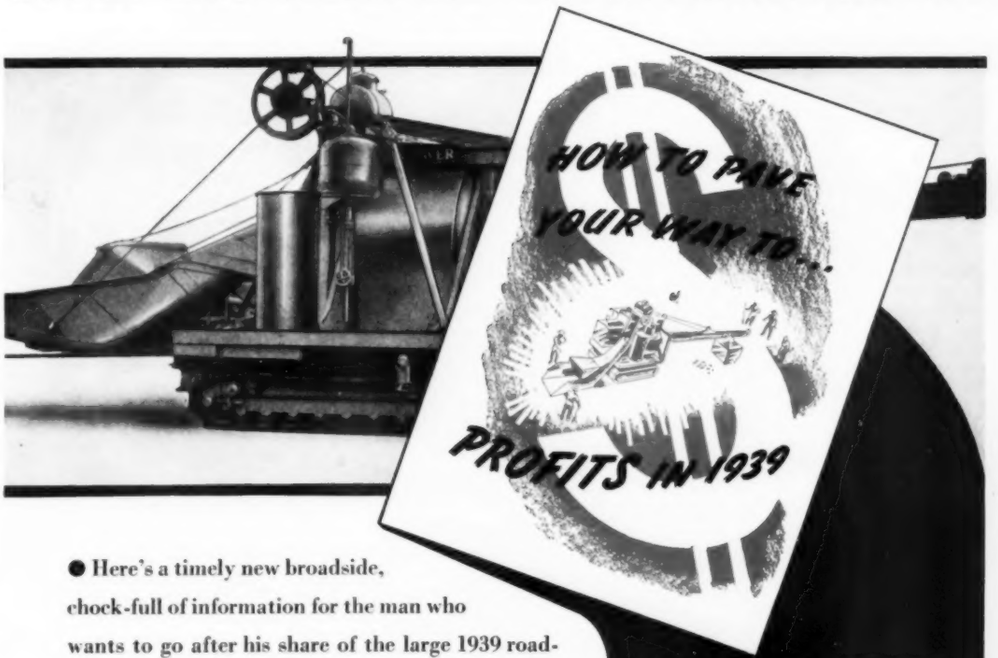
Gravel Base in Two Lifts

Gravel for the base courses was ob-

(*Continued on page 36*)

Concrete VIBRATORS
AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

HOW TO PAVE YOUR WAY TO PROFITS IN 1939!
With the REX 27-E PAVEMASTER



● Here's a timely new broadside, chock-full of information for the man who wants to go after his share of the large 1939 road-building program! It's the complete story of what's new and proved in modern Rex 27-E Pavemaster design. It shows you in detail how the famous Rex Mechanical Man operates to give you more batches in place every hour, every day—more miles behind you every week—more paving profits from every job! Make up your mind to make more paving dollars in 1939 and send for this broadside as the first step in that direction! Use the handy coupon.

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Please send me my copy of "How to Pave Your Way to Profits in 1939."

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The Mall Mass-Concrete Vibrator

New Vibrator Units Announced by Mall

In addition to improvements in practically every model in its line, the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill., has announced for 1939 a new mass-concrete vibrator and a universal electric short-coupled concrete vibrator. In addition, this company has announced a reduction in prices on all models of gas-engine, electric and air flexible-shaft vibrators.

The new mass-concrete vibrator for compacting large masses of concrete in dams, large footings, bridge piers, abutments and similar structures, is powered by a 110/220-volt, 60-cycle 3-phase 2½-hp dust-proof ball-bearing motor, complete with a 15-foot conductor cord. The vibrating element is constructed of specially hardened alloy steel, with extra heavy ball bearings throughout. High specific gravity off-balance lead weight is used to give the maximum vibration. The vibrator head is 5 inches in diameter and 10 inches long. There are two sets of two operating handles for two-man operation.

The universal short-coupled unit, which is 48 inches long, is available for operation on either 110 or 220 volts, either alternating or direct current. The unit includes a 1½-hp motor, and operating handles with 1-foot cord short-couples with a 12-inch flexible shaft to the 2⅜ x 19-inch vibrator head. A 3¼-inch vibrating element is also available.

Complete information on these two new vibrators is contained in literature which may be secured direct from the manufacturer.

New Chain Belt Dealer

The McClung-Logan Equipment Co., Key Highway & McComas St., Baltimore, Md., has been appointed by the Chain Belt Co., Milwaukee, Wis., as distributor for the complete line of Rex construction equipment in the Baltimore area.

'Ramsey'
3-SPEED ALL-STEEL HAND WINCH

2 Sizes

5-ton capacity — 135-lb. spools, 325' of ½" cable $75
3-ton cap'y — 75-lb. spools, 150' of ½" cable $55

POWER FOR HEAVY LOADS. SPEED FOR LIGHT LOADS. Gear Ratios: 25:1, 4:1, 1:1.

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Tractor Equipment For New TD-18 Unit

Bucyrus-Erie 2 and 4-wheel scrapers, Bullgraders and bulldozers, made by the Bucyrus-Erie Co., South Milwaukee, Wis., are now available in models specially designed for use with the new International TD-18 TracTracTor.

The M-81 4-wheel scraper has the exclusive B-E double-curve cutting edge which heaps the load regularly in all types of scraper material, according to the manufacturer. Single-cable control allows the operator to govern digging, hauling and dumping operations with a single lever.

To get dirt from difficult places and put it in difficult places, the H-74 2-wheel scraper is recommended with the TD-18. Like the small B-E scraper, the H-74 dumps backwards, behind its wheels, like a truck. This feature is designed particularly for building up fill, dumping into water over the edge of a bank, and also permitting stacking the load. A simple low-pressure hydraulic system controls the position for digging, hauling and dumping.

A larger size Bullgrader and bulldozer, of the same design as the smaller models, have been brought out for use with the TD-18. The Bullgrader will sidecast to either side and when the angling adjustment is set for sidecasting, the unit can move ahead continuously, leaving a smooth grade and rolling the dirt off to one side in a windrow. The blade can also be tilted to either side for cutting down banks or ditching. Features of the new bulldozer model are its balance and the conveniently placed hydraulic control valve, permitting positive and fast adjustment of the blade while the tractor is in motion.

Complete information on any or all of this new equipment may be secured direct from the manufacturer.

The F-4½ Barrow is built for easy loading or dumping, correct width for hoists, deep tray for wet concrete or mortar, Never-slip axle, 16" wheel with ball bearings, etc.

F-4½ Barrow—Pneumatic Tire

LANSING COMPANY
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Better Construction Profits

Good Mixers

IN ANY COMPANY

While men may be known by the company they keep, Hyatts are known by the equipment they help keep running. In mine and factory, on the farm, on railways and highways — everywhere — Hyatt Roller Bearings serve and save. For nearly fifty years these dependable bearings have helped make machinery operate more accurately, efficiently, and enduringly. Get better acquainted with Hyatt Roller Bearings. You'll find them good mixers everywhere in any company, on any job, at any time. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.

HYATT Roller Bearings

Review of Road Work In Wisconsin in 1938

(*Continued from page* 1)

points. The figures given do not include work handled by the Highway Maintenance Department, which is responsible for much surfacing work on highways built in previous years, nor county construction work. The total expenditures amount to $12,016,841, of which $982,500 was spent off the state trunk highway system on secondary roads. This is a decrease of approximately $104,000 over that spent in 1937.

The 1938 program covered 91 miles of new concrete surfacing, 80 miles of which was on state trunk highways. This is considerably less than that built in 1937, but it is interesting to note that expenditure for grading and drainage was increased this past year almost 70 per cent. to total approximately 310 miles. It is this new construction of modern up-to-date highways that is bringing the Wisconsin highway system up to the highest standard.

During the 1938 construction season 261 contracts were awarded and 172 day-labor permits issued to counties. These day-labor permits covered construction work done for the State Highway Department by the various counties. In 1937 there were 161 contracts and 148 day-labor permits issued. The figures given below show how the 1938 expenditure was placed and also the amounts of excavation involved:

TYPE OF WORK	MILES	COST
Concrete	90.670	$ 2,669,292
Gravel	130.110	810,529
Crushed stone	116.772	778,642
High-type bituminous	25.879	283,191
Low-type bituminous	473.864	394,351
Grade and drain	309.898	3,658,322
Structures		3,322,249
Miscellaneous		180,266
Total	1,147.193	$12,016,842

AMOUNT OF EXCAVATION

Common excavation	8,004,892 cubic yards
Rock excavation	1,395,029 cubic yards
Marsh excavation	678,693 cubic yards
Unclassified excavation	1,634,763 cubic yards
Borrow	1,978,764 cubic yards

Design Aids Snow Removal

The modern highway, such as those now being built in the State of Wisconsin, is a far step from the old highway which was not designed for present-day needs. In addition to the elimination of all dangerous horizontal and vertical curves and many other hazards to the present-day motorist, these new highways in Wisconsin are designed to solve the snow-removal problem. They are slightly elevated and a wide right-of-way permits a wide shoulder and a gentle slope back from the ditch line. Thus snow can be pushed far back from the highway itself as soon as the first snow falls, making room for subsequent falls of snow and simplifying the problem of snow removal as well as reducing its cost.

The above information was furnished by the Wisconsin State Highway Department, at Madison.

New Actuator Valve For Clutches, Brakes

Included in the exhibit of Vickers, Inc., 1400 Oakman Blvd., Detroit, Mich., at the A.R.B.A. Road Show last month was the recently developed clutch and brake actuator valve, for use in standardized Vickers multiple-unit valve assemblies or alone, for the remote and effortless operation of clutches, brakes or other mechanisms which are operated in a similar manner.

This new valve may be adapted to either an accumulator pressure system or to a pump pressure system. In the latter case, it is so arranged that the pump is automatically unloaded when no pressure in the system is required, but at the same time makes the operation of each valve independent of the others when more than one is used in a multiple assembly. Also an arrangement is provided whereby a small reactionary effort in proportion to the operation effort is transmitted to the actuating lever, so that the operator can "feel" the engaging effort which is being applied. The new clutch and brake actuator valves are of interest to users of shovels, cranes, draglines and similar heavy equipment where fatigue or loss of time because of heavy levers may be a problem.

Complete information on these new valves may be secured by those interested direct from the manufacturer by mentioning this magazine.

Ford Trucks Converted To All-Wheel-Drive Units

Without sacrificing any of the standard Ford truck's speed, ease of handling and economy of operation, its effective traction can be practically doubled by converting it to all-wheel drive, according to the Marmon-Herrington Co., Inc., Indianapolis, Ind. This company has just issued a new bulletin entitled "Double the Work Power" which contains illustrations of various Ford models, brief mechanical specifications, and detailed information on the changes that are made in the chassis at the Marmon-Herrington plant. Copies of the bulletin may be secured by those interested direct from the manufacturer by mentioning this item.

Line of Asphalt Plants

A complete line of asphalt plants for hot or cold mix, in any capacity, portable or stationary models, for operation by steam, electric or diesel power, is made by the Simplicity System Co., Chattanooga, Tenn. Literature describing these plants may be secured direct from the manufacturer by mentioning this item, or from this magazine.

"VIBRATORY FINISHERS"

The "FLEX-PLANE" 20" electrically vibrated screed is furnished on both the straight gas and gas electric finishers. Vibrations are carried deep into the harsh concrete and subgrade—eliminating honeycombing at the road forms. The capacity of the "FLEX-PLANE" finishing machine easily exceeds the output of Dual Drum Pavers by screeding backward, as well as forward.

FLEXIBLE ROAD JOINT MACHINE CO.
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LOOK

WHY BUCK TODAY'S PROBLEMS WITH YESTERDAY'S EQUIPMENT?

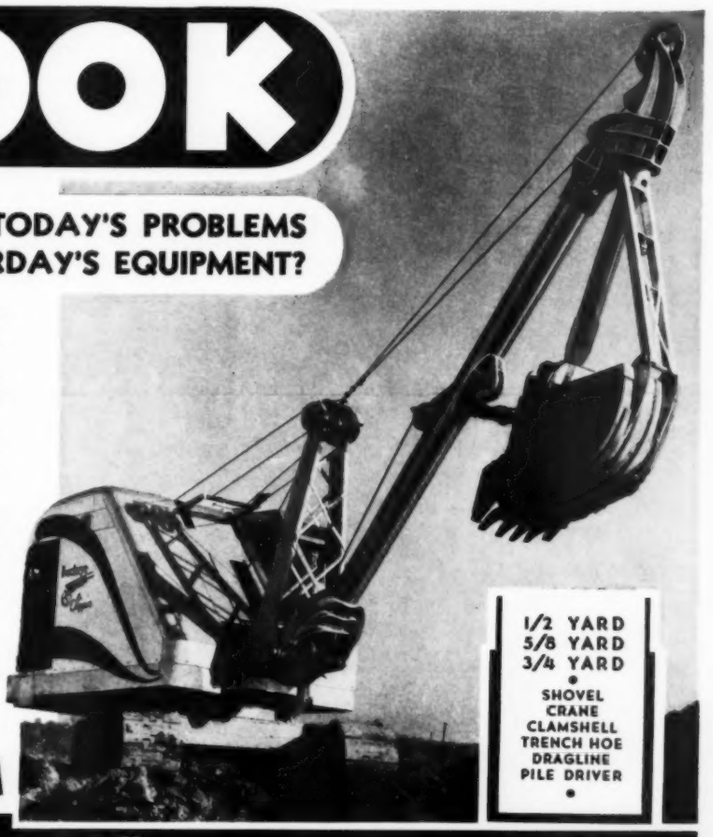
Here is a Real profit maker ..not just another machine.

It gives you new and exclusive profit making features.

Outstanding are its non-clogging self-cleaning traction crawler units and . . .

Metered Vacuum Control . . . as "simple and easy as flipping electric switches" yet it gives you "control as smooth as steam".

See a Buckeye representative before you buy any excavator this year.



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Planning Types of Paving For New York's Fair Site

(Continued from page 2)

Construction Roads

With the adoption of a general layout of communicating roads, work began on the planning of buildings and necessary public utilities, and the solution of the problems involved in a choice of road surfaces. The first was the requirement of temporary roads for construction purposes. Consideration was given to various suggested plans for soil treatment to produce a stabilized surface, but it was found that the material, which was mainly ash and cinders, was easily compacted by traffic and formed an adequate wearing surface, in most places, for truck operations. As streets were gradually laid out by the process of staking lots for building construction, it became possible to confine the truck traffic to more or less definite routes where the surface usually was compacted sufficiently to sustain the early construction traffic. A limited amount of grading and ditching was necessary to provide for temporary drainage and additional cinders were placed where the existing surface was unsatisfactory. In a few locations where there was a very thin layer of ash over the original soft bottom, a corduroy mat of heavy timber was constructed, covered with a layer of run-of-bank gravel, over which construction traffic was routed. This foundation served later on as a sub-base for the final pavement.

Two Pavement Types

In the final plans, roads were divided into two types: one for the routing of buses which are to provide for the transportation of visitors throughout the Fair; and another for the interconnecting routes which form the various avenues, esplanades and plazas. The latter will be used largely for pedestrian traffic but are also to carry such vehicular traffic as is necessary for service to buildings, street sprinkling and similar operations.

In deciding on a wearing surface for World's Fair roads, consideration had to be given to the fact that a certain amount of settlement was inevitable. This made necessary the adoption of a surface which could be conveniently repaired in cases of settlement and after the making of street openings for service connections. Finally, the unit cost was limited, inasmuch as all Fair construction was financed within a fixed budget. These conditions led to the selection of bituminous macadam as a surface for most of the roads. One portion of the intra-mural circulating route adjacent to the Grand Central Parkway and in an area of well consolidated material was paved with reinforced cement concrete. All other roads and paths are paved with bituminous macadam.

Heavy Traffic Roads

The standard heavy-traffic road, known as Type A, consists of a 4-inch compacted crushed-stone base course, a 2-inch compacted binder course and a 1-inch compacted top course laid cold. The base course was laid directly on the rolled subgrade and is composed of a uniform mixture of broken stone in sizes ranging from 1 to 3½ inches, thoroughly compacted by rolling, after which dry screenings or sand were spread on the surface, swept into the voids and rolled dry.

The bituminous macadam mixtures are composed of broken stone, which for the binder course varies in size from ¼ to 1 inch; and for the top course or wearing surface from ⅜ to⅝ inch. Fine aggregate, all passing a ⅛-inch screen, was used in a percentage of from 4 to 10 in the case of the coarse mix and 10 to 25 in the case of the fine mix. Asphalt in the former case ran from 3 to 5 per cent and in the latter 5 to 7 per cent. From 0.5 to 1 per cent of hydrated lime was added.

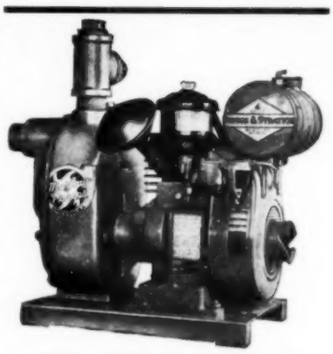
Materials and processes of manufacture were substantially as described in the New York State Highway Specifications for cold-laid mixed bituminous macadam using a naphtha liquifier.

Light Traffic Roads

For the roads of lighter traffic and where the subgrade material was firm, Type B pavement was used. Specifications for material and construction were the same as for Type A, except that there is no stone base course and the pavement consists of a 2½-inch compacted binder course laid directly on the rolled subgrade with a wearing surface or top course 1 inch in thickness.

The appearance of both types of

(Continued on next page)



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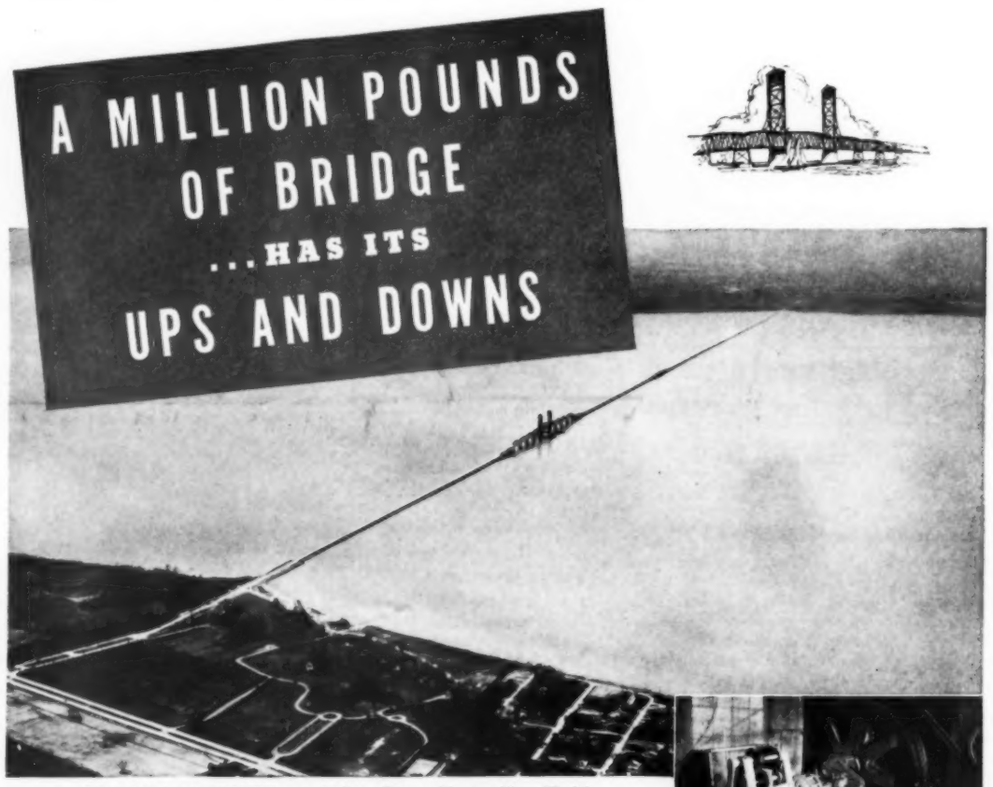

FAMOUS HIGHWAY SHORT-CUT across the James River at Newport News, Virginia. 4½ miles in length, the draw is 300 feet long and lifts 100 feet, giving 150 feet clearance above tidewater to permit passage of battleships and other craft.

SIMILAR MECHANISM IN EACH TOWER lifts a draw that weighs a million pounds. Baked in summer, frozen in winter, it's a tough spot for any lubricant. Nothing but Crater Compound has ever been used on these gear teeth or the wire rope.

THIS 4½-MILE HIGHWAY structure across the James River at Newport News, Virginia, opened to traffic in 1928. Ever since then, the gears, pinions, and wire rope of the draw have had no other lubricant than Texaco Crater Compound.

For 10 years, Texaco Crater Compound has kept these gears and wire rope protected from undue friction and weather, never failing to meet all demands made upon it.

To get trouble-free service from exposed gears and wire rope, get in touch with Texaco. Texaco's lubrication engineers will help you make a sound selection. And Texaco's 2229 warehouses will make prompt delivery wherever you are.

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THIS CRATER COMPOUND BOOKLET – 32 pages of practical information relating to open gear teeth and wire rope protection. A copy is yours for the asking.

ON PINIONS AND GEARS like these, Crater Compound clings, resisting the natural wiping action of gears in mesh, protecting against metallic contact.

TEXACO Crater Compound

Over 1,000,000 Yards Of Pavement for Fair

(*Continued from preceding page*)

pavement when laid is the same; the only difference is in their adaptability to greater or lesser loads of traffic.

Pedestrian Walks

There are also pedestrian walks in various areas which will have no wheel traffic and hence could be of lighter construction. In general, these were made by preparing a 4-inch base of rolled steam cinders on a compacted subgrade, and covering this with a wearing surface of bituminous macadam laid cold to a thickness of 1 inch. In this mixture there is no stone larger than ¼ inch, and the fine aggregate or sand comprises from 60 to 80 per cent of the total volume, while the percentage of asphalt is between 6 and 9.

After rolling, the surface was uniformly spread with light colored stone chips at the rate of 5 to 7 pounds per square yard to improve its appearance, and the chips were thoroughly imbedded in the surface by additional rolling.

Curbs are of two classes. Where it is necessary to outline definitely the route of heavy traffic, or where the plans of the architects required an ornamental finish adjoining the street, a concrete curb was used; otherwise wood curbs in the form of a 2 x 8-inch header 2 inches above the paved surface were considered adequate.

Parking and Bus Areas

A considerable area of paved surface is devoted to parking of private cars and for the arrival, departure and temporary storage of buses coming from a distance. For the latter there has been provided a field adjacent to Roosevelt Avenue and the Willetts Point Boulevard Station of the IRT-BMT subway systems with a capacity of about 500 buses. This field, which is on a good clay and gravel fill, has been adequately surfaced with Type B pavement. Other parking fields, which are placed on low ground adjacent to the lakes and at the southerly end of the area, required a foundation of broken stone or cinders under the wearing surface.

Planned Paving Program

There was nothing unusual in the various studies which led to the selection of these types of pavement. It is substantially the same problem which confronts any paving engineer who has to pave a new development in accordance with certain limitations as to use and cost. The real difficulty at the World's Fair has been in the fact that orderly progress and strict control of an area for any one operation such as paving has been impossible among the various other construction tasks which have been going on simultaneously. Due to the necessity of opening the whole Fair at a fixed date it became necessary to work out a paving program that would allow completion before that time. This in turn required the laying of finished pavements adjacent to heavy foundation and building construction work, which also had to utilize every minute up to the opening date. It was necessary in some cases to relay pavements which were damaged by the operations of the foundation and building contractors. Another cause of damage to pavement was the frequent necessity of making cuts for unanticipated service connections. There could be no definite knowledge as to where such connections would be required until adjacent space was fully leased. If the paving operations had been delayed until all interfering street work was out of the way, it would have been impossible to finish the roads on time.

Bituminous Plant

William P. MacDonald Construction Co. of Flushing, New York, was contractor for almost all street paving. Its plant, located on Flushing Creek within a short distance of the World's Fair site, was capable of turning out either hot or cold mixes with a total capacity of 1,000 tons per eight-hour day, and was therefore well suited to handle such a contract as that for the New York World's Fair, in which time was the essence of the problem. The movable equipment used in the field included power shovels, graders, mechanical asphalt spreaders and gasoline-powered rollers. A maximum of about thirty trucks made deliveries from the plant to the job. A rate of progress of about 6,000 square yards per day of completed pavement has been necessary, in order to finish on time the total of approximately 1,000,000 square yards, exclusive of paving for parking fields, walks and pools.

(*Concluded on page* 33)

GRACE ROAD SWEEPER

Drives from both rear wheels. Roller bearings throughout

The RAPID FIRE TANK CAR HEATER

Combination Steamer & Pumping Booster—Thermostat shuts burners off at predetermined temperature.

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1. Six-cylinder full Diesel engine.
2. Engine is started easily from the operator's seat.
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7. Pivot shaft relieved of twisting stresses, and tracks kept in alignment, by ball-and-socket outer pivots, diagonal-arm inner pivot bearings, and roller stabilizer.
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9. Triple-gear oil pump. Full-pressure engine lubrication at all working angles.
10. Positive track roller lubrication at all speeds. Quintuple-sealed track rollers have patented gravity lubrication at low speeds and pressure lubrication at high speeds. Oil and dirt seals on both sides of sprockets. Self-cleaning idler wheel.
11. Tocco-hardened crankshaft with replaceable main and connecting rod bearings.
12. Unit construction. Each steering brake, steering clutch, track frame assembly, and other units, adjusted or replaced without disturbing adjacent parts.
13. Famous TracTracTor accessibility. More productive hours, low maintenance cost.
14. Allied equipment engineered for the TD-18 by well-known manufacturers.

HERE is real news that operators of heavy-duty mobile power have long been looking for: International presents a new 70 h.p. (*drawbar*) Diesel TracTracTor, extending the benefits of International design and performance to a much broader field.

In this latest product you will find the sound engineering and precision manufacture that is well-known to all users of TracTracTors—*plus advanced design, many patented features and improvements.* The flexible adaptability of the TD-18, with its 6 forward and 2 reverse speeds, will be a surprise, whatever your experience up to this time.

Equipment especially designed for use with the TD-18 includes **SCRAPERS, BULLDOZERS, BULLGRADERS, ROAD GRADERS, WAGONS, SNOW PLOWS, WINCHES, LOGGING ARCHES.** Company-owned branches and International industrial power dealers will tell you all about the features of the International TD-18 TracTracTor.

INTERNATIONAL HARVESTER COMPANY
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180 NORTH MICHIGAN AVENUE CHICAGO, ILLINOIS

INTERNATIONAL POWER *is made by the makers of* INTERNATIONAL TRUCKS

Hiwassee Project At Concreting Stage

Latest TVA Dam Under Construction In North Carolina Being Built on Hard Rock Foundation Grouted to Prevent All Seepage

(*Photos on page 4*)

✦ THE highest of the series of dams being constructed by the Tennessee Valley Authority is well on its way toward completion on the Hiwassee River in the mountains of North Carolina. The construction of Hiwassee Dam began in the autumn of 1936 when the stripping of the dam abutments was started. Pouring of concrete has been under way since May 1, 1938, and it is expected that the dam will be completed by the end of 1940.

Hiwassee Dam will be 307.5 feet high, 1,265 feet long and will impound a lake of 6,300 acres with a normal headwater elevation of 1,526 feet and a capacity of 434,800 acre-feet. The reservoir formed by the dam will extend upstream for approximately 22 miles. Although Hiwassee will be about 40 feet higher than Norris Dam, the area of Hiwassee will be small compared with Norris and the other TVA lakes, and will have a shore line of only 150 miles. Before the reservoir is flooded, some 3,500 acres of woodland will have to be cleared, all buildings within the basin removed and 29 miles of state and county highways relocated.

The base and abutments of Hiwassee Dam are built upon a foundation of graywacke rock, regarded by TVA engineers as the best rock found at any of the sites investigated by the Authority. But in order to prevent possible seepage under the dam, this graywacke rock foundation is being grouted with cement near the upstream face of the dam. Grout was forced into the underlying rock before the pouring of concrete began and will be forced in again after the dam is partially completed.

The spillway section will be 260 feet long and is located approximately over the present river channel. Control of the spillway will be by seven radial gates, each 23 feet high and 32 feet long, operating above the spillway crest. They will operate to give a normal full reservoir level of 1,526 feet above mean sea level. The spillway will have a capacity of 130,000 cubic feet per second at flood elevation of 1,532. This will be supplemented by four conduits through the dam which will provide an additional capacity of 22,000 cubic feet a second. Galleries will be provided in the dam for the operation of valves and for inspection. A roadway 20 feet in width will cross the dam and also serve as an operating deck for the control of the spillway gates.

Present plans do not call for the installation of any electric power generating equipment, although provision will be made for the installation of two 57,600-kilowatt generators of the outdoor type in the future. These units will be to the left of the spillway at the base of the dam. A small office building will be constructed back of the generating units. Water for the generators will flow through power penstocks 18 feet in diameter.

Town of Hiwassee

The new town of Hiwassee, also being built by TVA, is now completed, with some forty-five semi-permanent buildings and about a hundred temporary houses and buildings occupied by the approximately 1,000 workers employed in the construction of the dam and their families. The town, located on a wooded elevation overlooking the dam site, is modeled after the town of Norris, Tenn.

Finishing Machine Bulletin

The Flex-Plane gas-electric or gasoline-powered finishing machine, with a 20-inch single screed, for producing smooth-riding concrete pavement, is described in Bulletin U-70, copies of which may be secured by those interested direct from the Flexible Road Joint Machine Co., Warren, Ohio, or from this magazine.

New Browning Crane Dealer

W. M. Brooks, 9725 Phinney Ave., Seattle, Wash., has been appointed distributor in the Seattle district of the State of Washington for the line of equipment manufactured by Browning Crane & Shovel Co., Cleveland, Ohio.

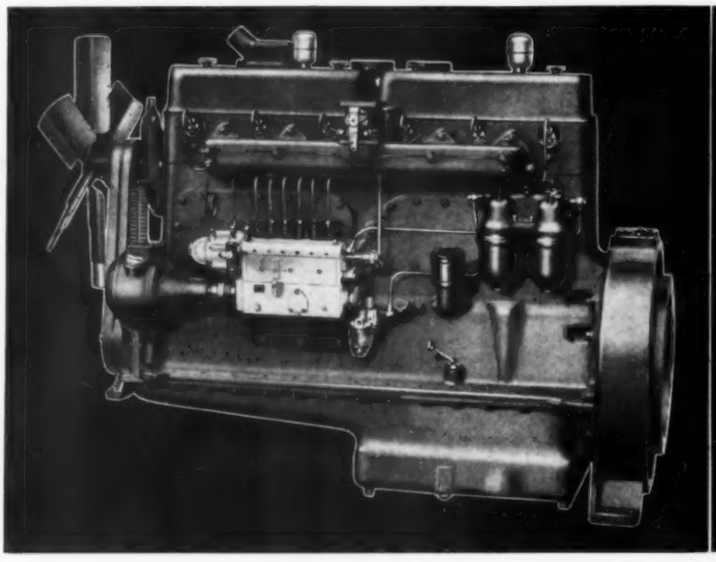
"REX BEST IN FLOOD TEST!"

That's the report received from a superintendent who was forced to use all types and makes of pumps in the flood areas last spring. He goes on to say—"There was not a pump in the flooded districts that gave better performance, and in most cases even equaled the Rex Pumps." That's what you get when you buy Rex—the "quality-built" pumps with the wear-defying, corrosion-resisting Rex Z-Metal "Peelers" and impellers.

See why this year and every year Rex is the buy! Send for new 1939 book, "Pay Less for Pumping." Address Chain Belt Company, 1666 W. Bruce Street, Milwaukee, Wisconsin.

REX SPEED PRIME PUMPS

The New SPARK DIESEL



Hesselman Patent

BUILT IN TWO SIZES 160 hp. TO 200 hp.

A WAUKESHA ENGINE with

7-Bearing Crankshaft, with 4-inch Main Bearings
Removable Wet Sleeves, Molychrome Iron Cylinders
Patented Non-Stick Piston Rings; Full Pressure Oiling
and the famous Hesselman fuel injection system

SUITABLE FOR heavy earth moving vehicles, tractors, contractors' machinery, 1¼-2 yd. excavators, cranes, hoists, irrigation water supply, stationary and portable generating sets, cotton gins, and general industrial power—oil field cable tool and rotary drilling—also built as a marine engine. Delivery Now. Write for Bulletin 1135.

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
NEW YORK · TULSA · LOS ANGELES

BURNS easily obtainable DOMESTIC FURNACE OILS AS WELL AS HIGH SPEED DIESEL FUELS and can even operate on gasoline in an emergency, if mixed with small amount of lubricating oil

Cut Costs on Maintenance

. . . easily save $150 to $300 monthly on repair work with this Hobart Portable Gas Drive Arc Welder. Indispensable on new construction work. 30 Days Trial at our risk will prove it pays! HOBART BROS. CO. Box CE-49, Troy, Ohio

PICKS and SHOVELS

By O. E. POTTER

Cow Threatens Levee Work

A cow's taste for survey notes seriously threatened work on one section of the Lower Mississippi last month. The head of a survey party, busily engaged in getting some cross sections for a report to the Area Office, found he had just too many things in his hands at the moment and so laid his survey notebook on the grass on the river side of the levee while he ran over to the other side to check a stake.

When he returned a few moments later he was faced by a soulful-eyed cow, meditatively chewing away and gazing blissfully into the distance. To the engineer's intense surprise, he recognized his notebook on its way to produce, perhaps, a new brand of "engineered" milk.

Fortunately for the work of the party, the engineer was able to rescue part of the book and the work was delayed but slightly, although it did prove embarrassing when the District Office wanted some of the chewed notes in a hurry. Now, however, notebooks aren't laid on the grass in that Area any more.

Mental Driving Hazard

In Zimferopol, capital of the Crimean Republic, the streets were recently repaved with tombstones from local church yards. *Highways and Bridges* of London reports that timid drivers voiced objection, not because of any strong religious sentiment, but because they found the tombstones a mental driving hazard.

Hazards and Cows

Speaking of hazards,—and cows—we are reminded of a story related by a friend of ours about a tournament golf match in which he participated in Trinidad. Finding himself in the very unusual position of being in the rough, he also found himself without his golf ball. A lost ball is pretty important in a tournament match, but much searching failed to reveal the elusive "pill." It did, however, reveal a cow calmly chewing what our friend supposed to be her cud. And then a suspicion arose in his mind. Further investigation proved that "Bossy" was calmly chewing the golf ball.

It was finally rescued and our friend went on with his play, but not too successfully, one can imagine, with a badly chewed ball. He has played lots of golf, and met all types of hazards, but it was the first time that losing his ball to a cow had been encountered as a golf-course hazard.

Horse Sense for Drivers

At the 1896 meeting of the British Association for the Advancement of Science, it was contended that horseless carriages could never be widely used because their operation required too much skill. The driver, it was pointed out, had not the advantage of the intelligence of the horse in shaping his path.

Sometimes, in spite of indications to the contrary, we think the Association is still right!

Mileposts as Monuments

Modern budget balancers may have overlooked a possibility. In the days of ancient Rome, according to a recent issue of *Highway Research Abstracts*, road taxes were raised not by the mile but by the milepost. The Romans named their highway milestones after prominent cash contributors. Any offers?

N. J. Highway Dept. Joins Fight on Roadside Erosion

"'Save the surface and you save all' applies to highways as forcibly as it does to homes," said H. J. Neale, Landscape Engineer of the Virginia Department of Highways, in an address before state and county highway officials at a meeting of the Roadside Erosion Institute arranged by the New Jersey Soil Conservation Committee.

As a result of the importance of the roadside erosion problem, the New Jersey State Highway Department has entered into cooperative effort with the Federal Soil Conservation Service in order to do something about that problem in New Jersey. Similar arrangements are expected to be made by a number of county and township highway departments.

Remember that proper lubrication definitely contributes to profits by preventing breakdowns and maintaining efficient operation of equipment on the job.

STERLING BALANCED WHEELBARROWS

Greater part of load balanced over wheel

NO. S-18 CONCRETE BARROW

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

We manufacture a complete line of Hand Sinkers, Paving Breakers, Pneumatic Diggers and Tampers, Wagon Drills, and Miscellaneous Accessories.

HOW TO KEEP THE SAND-HOGS *happy*

● Deep under the earth's surface, sometimes with the river flowing its muddy, turbulent way a hundred feet or so above his head—in dank darkness, lighted by a few quivering electric bulbs, or his own flickering miner's lamp—always in discomfort from trickling water and crowding quicksand—daily subject to the dangers that are an inseparable part of his chosen occupation—the worker we call a "sand-hog" finds in his shift little enough of cheer. It helps a lot if his tools are right. He needs the fast, easy-holding Cleveland CD8 to help him get his bonus. The CD8 tires him less, and doesn't slow him up by breaking down on the job. The CD8 is a real friend to the sand-hog.

And a friend it is also to the contractor. The CD8 gets more work done with less cost for compressed air and less expense for repairs. It's built to stay on the job, where a clay digger belongs. Either inside or outside trigger provided, or the extended trench-digger handle. Demonstration on your own job, with your own operators, any time. Bulletin on request.

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Newton Highlands, Mass., 130 Needham St.
Los Angeles, Calif., 821 Santa Fe Ave.
Winchester, Ky., 10 French Ave.
New York, New York, 200 Church Street
Richmond, Va., 12 North 18th St.
Salt Lake City, Utah, 418 Dooly Bldg.

THE CLEVELAND ROCK DRILL COMPANY

3734 EAST 78TH STREET • CLEVELAND, OHIO

Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT

Plant for Concrete For Widening Job

(*Continued from page 1*)

The first was 5 miles from the west end, the second at the mid-point of the job, and the third at the east end. A novel combination of batching plant, batch trucks, transfer plant and truck mixers was used. By placing the batching plant at a location where aggregates could be stock-piled readily or handled direct from gondola cars, and then using three to four batch trucks for hauling the dry batches to the transfer plant located so as to minimize the haul of the truck mixers and yet permit them sufficient time to mix the concrete before delivering it to the widening strip, the ready-mix operator reduced the plant investment required.

At the batch plant a Koehring crane with a 35-foot boom and a 1-yard Blaw-Knox clamshell loaded the Blaw-Knox bins and batchers equipped with Toledo dial scales. The batches consisted of 3,570 pounds of stone and 2,100 pounds of combined sand and stone screenings for a 7-bag batch, with 57 gallons of water.

The hauling fleet consisted of four to five trucks, three of which were single-batch and two of which were two-batch bodies mounted on International and Mack trucks.

The Transfer Plant

The transfer plant consisted of a Northern conveyor with a 24-inch belt 40 feet long driven by a 4-cylinder Hercules engine and with a 4 x 8-foot hopper 4 feet high built over the receiving end. A separate hopper 3 feet square was mounted over the conveyor just beyond the aggregate hopper and equipped with a quick cut-off gate. This hopper was used for dumping the seven bags of cement for each batch. Coosa portland cement was hauled by truck to the transfer plant and unloaded to a 100-bag platform. Two men on the truck passed over the bags of cement to the platform or direct to the transfer plant and one man did all of the dumping. One re-loader operator ran the conveyor, operated the slide gate on the cement hopper, and watched the water meter.

The aggregates and cement were delivered through a telescope chute at the upper end of the conveyor into the 1½ and 1-yard truck mixers. Water for the mix was stored in a 1,000-gallon tank alongside the transfer plant, with a 1½-inch Gould centrifugal pump powered by a Wisconsin engine delivering the water through a 2-inch pipe line attached to the side of the conveyor. The water was measured by a Worthington 1½-inch disc meter just beyond a three-way valve which permitted the water to flow through the meter to the truck or returned it to the tank while the pump ran continuously.

Mixing and Placing Concrete

The batches were delivered to four 1½ and 1-yard Jaeger truck mixers mounted on International trucks, owned by the Concrete Construction & Supply Co. These trucks delivered the concrete by chute to the widening trench or leveling course area, as required by The Wesco Co., which purchased the concrete in place.

Nine-inch steel forms were set on the outside of the widening trench, and on the inside where the concrete was placed close to the old pavement but not in direct contact with it, regular paving forms were used with the bases cut off. The leveling courses on curves were reinforced with bar mats with ½-inch square bars on 12-inch centers, the mats being 4 feet wide. All screeding and finishing of the concrete was done by hand because of the irregularity of the widening strip and the leveling courses. Wesco used three to four finishers and four screed men. The runs averaged about 3,000 feet of widening strip with the necessary leveling course adjacent per 10-hour day, run in two shifts.

The concrete was cured with burlap for 36 hours and then for an additional six days tank wagons with perforated pipe headers offset to the side sprinkled the bare concrete. The burlap was left on the headers for five days and in a few places sawdust was used for curing.

Shoulders

Throughout the widening contract 8-foot shoulders were built on both sides of the widened pavement, with an 18 to 1 slope. The front slope to the ditch was 6 to 1, with a 2 to 1 slope on back slopes and on fills. Four inches of top soil was placed on the shoulders and in the ditches. The bottom of the ditches and tops of all banks were rounded to a varied radius.

Personnel

Federal Aid Project, 45-8, Parts 2 and 3 and 45A reopened, extending 16.689 miles on U.S. 76 from the Broad River Bridge at Columbia, S.C., to the Lexington County line, was awarded to The Wesco Co. of Chattanooga, Tenn., on its low bid of $367,965.63. Manuel Russ was Superintendent for Wesco. W. H. Dolan was Superintendent for the Concrete Construction & Supply Co. of Columbia, S. C., which furnished the concrete for this project. Hood C. Worthy was Resident Engineer on the project for the South Carolina State Highway Department.

Tarpaulins and Road Mats

Complete information on the Fulton line of road mats and burlap for use in concrete curing, as well as tarpaulins, windbreaks and any other canvas job necessities, may be secured direct from the Fulton Bag & Cotton Mills, Atlanta, Ga., or from this magazine.

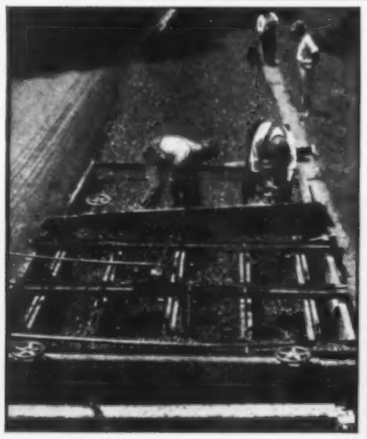
New Aluminum Paints For Maintenance Use

A new principle in aluminum paint production, that of producing one group of paints for maintenance work and another for product finishing, has been announced by the Paint Division, Aluminum Industries, Inc., Cincinnati, Ohio, producer of Permite ready-mixed aluminum paints. Both groups of paints are ready-mixed and ready to use, without any mixing on the job.

In the maintenance group are included a Permite outdoor aluminum paint of the long oil type for exterior applications; a wet surface type for application on wet, damp or moist surfaces; a quick drying type; a medium oil length type for machinery and equipment; a utility grade for interiors; a general purpose maintenance type; and one to meet Federal specifications.

Further details on these paints may be secured by interested contractors and state and county highway departments direct from the producer.

BE SURE THIS NAME IS ON YOUR ROAD EQUIPMENT



BITUMINOUS RESURFACER—designed to resurface roads by the mixed in place method. One pass of this Resurfacer thoroughly mixes materials—levels it off ready for the roller. For easiness in resurfacing roads, this Littleford Unit has no equal.

PRESSURE DISTRIBUTOR—This Littleford Model "C" De-Luxe Pressure Distributor is becoming the leader in the field due to its simplicity in operation and gadgetless design. Applies bitumen accurately at any spray bar length. Heats material faster; has low pressure burner—burns low cost fuel oil. Sizes from 500 to 3000 gallons.

No. 150 WHEELED ROLLER—This self-propelled portable Roller has been designed to Roll Road Patches—trails behind any truck at any speed. The patented "Tongue Up and Over" Principle changes the Wheeled Roller from Trailing to Rolling and visa versa. Furnished power driven or not motorized for truck operation.

Supplying Power for Single-Phase Welders

For several years motor-driven single-phase generators have been used for practically every type of welding service but recently the importance of adequate power supply for single-phase welding circuits of high capacity has become generally recognized. Using experience derived from the performance of these generators as a basis, R. H. Wright of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna., discussed the correct application of conversion equipment for future applications in welding before the recent A. I. E. E. winter convention in New York City.

Mr. Wright pointed out that the use of generators with specially designed single-phase windings is preferable to using one phase of a three-phase machine. Because of the vibration usually inherent in single-phase machines, welding generators should not be overloaded consistently. Output voltage can be controlled more readily if the peak load is not greatly in excess of the normal capacity of the generator. The rated power factor of welding generators ranges from 30 per cent for spot welders to 60 or 70 per cent for butt and flash welders.

For some applications it is desirable to operate more than one welder from a single generator. Two or more spot welders with electronic timers can be operated from a single generator of minimum capacity, if an electronic synchronizing device is used to permit only one welder to be energized at one time. Such an arrangement introduces no appreciable delay in production, since each welder in turn is locked out for only a fraction of a second.

All-Steel Hand Hoists

Beebe Bros. all-steel hand hoists, for use on jobs where power is not available or practical, are manufactured in 2, 5 and 15-ton sizes and are equipped with a patented instant gear change and positive internal brake. The 2-ton model has gear ratios of 4 and 22 to 1; the 5-ton model, ratios of 4 and 24 to 1; and the 15-ton model, 4, 19 and 109 to 1.

Complete information on these hand hoists may be secured direct from Beebe Bros., 2724 Sixth Ave., So., Seattle, Wash., or from this magazine.

New A-W 1939 Catalog

Among the Austin-Western equipment described in the new 1939 catalog are the Model 99 motor grader with 13.50 low-pressure tires, two new scrapers of 6 and 8-yard capacities similar to the 5-yard unit, and the latest model of the Badger shovel. Detailed descriptions and illustrations showing this equipment, as well as other A-W equipment, on the job are included.

Copies of this interesting 24-page catalog may be secured by interested contractors and state and county highway engineers direct from the Austin-Western Road Machinery Co., Aurora, Ill.

Hillsborough County Has Big Road Program

(*Continued from page* 1)

Springfield 7-ton rollers, two Littleford motorized Wheeled Rollers, one 1½-ton Ford truck, and one slag spreader.

The Divisions of the county each have three or four wheel tractors, one or more graders with 8-foot blades and about six 1½-ton trucks.

Bond-Issue Work

Under various county bond issues Hillsborough County has constructed some 300 miles of limerock roads with slag surface treatment, some sheet asphalt and asphalt block roads, a few miles of patented types, and about 55 miles of vitrified brick pavement.

The limerock construction is typical of the county work and is described in some detail below. On the prepared subgrade 8½ inches of loose Ocala and Brooksville limerock is spread, wet, rolled, scarified, wet and rerolled until a smooth base is secured, with the addition of new rock wherever any low spots are shown up under the rolling and with straight-edging. Planks 2 x 8 inches and 10 feet long are set on edge as forms for the spreading of the limerock and staked every 2 to 3 feet. They are pulled as soon as the rolling is completed.

This base is primed with 0.2 to 0.25 gallon per square yard of tar and allowed to stand for three weeks or longer until dried out and cured under ¼-inch or less of sand which is broomed continuously back onto the road under traffic wherever bleeding is apparent. After the curing is complete the road surface is swept thoroughly by hand and machine and liquid hot asphalt of a penetration of 45 to 60 is applied at the rate of 0.4 gallon per square yard. The application temperature is specified at between 275 and 300 degrees Fahrenheit. On the asphalt a layer of slag is spread immediately by a disc spreader on the back of a truck which is backed onto the asphalt, running on the slag. This slag is placed at the rate of 40 pounds per square yard rolled with a 7-ton roller and traffic admitted at once.

New Emergency Light

A new carbide light for emergency lighting has recently been announced by the Hunter Mfg. Corp., Bristol, Penna. This Rex emergency light is equipped with a simple valve mechanism which is designed to prevent the generation of gas so rapidly that explosive pressures are built up, and at the same time control the light to a 250 to 350-candlepower radiance. An umbrella-like arrangement inside the container holds the carbide in place, to prevent powdering. The manufacturer states that this light can be stored or transported for long periods without deterioration. It is easily placed in operation by removing the hermetic seal at the top and at the bottom of the container, placing the light in water having a depth of about 14 inches, and lighting the burner. The top of the lights is shaped to provide a recess that deflects the wind upward from the light to prevent its being blown out. A baffle just below the burner prevents sputtering by causing precipitation of any moisture that may be held in suspension. This light will burn for 2½ hours.

A folder describing and illustrating the Rex emergency light may be secured by interested contractors and state and county highway departments direct from the manufacturer by mentioning this magazine.

Want information on equipment? Write the Editor.

LB LITTLEFORD

BLACK TOP ROAD MAINTENANCE EQUIPMENT — SINCE - 1900

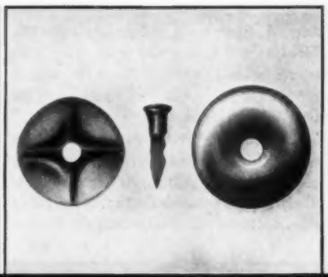
Designed Black Top Equipment

Littleford Bros. through years of effort have given to State, Federal, County and City Highway Departments, as well as Contractors, Black Top Road Equipment that makes the building or maintenance of such roads easier and less costly. Each Littleford Unit has been engineered and designed to do its particular job with more efficiency and to give these Black Top Road builders the units they need to do their work the modern way. For Equipment needed to do modern Road Work, you can be sure it is the best and most efficient if it contains the Littleford Trade Mark.

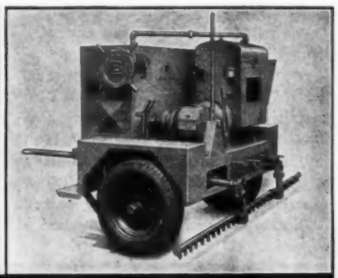
LITTLEFORD BROS.
435 E. PEARL STREET CINCINNATI, OHIO

TAR AND ASPHALT KETTLE—The Littleford 84-HD Kettle with the patented "Double Heat Circulation" and "Screened Reservoir" gives users the fastest heating kettle made today. Keeps a continuous flow of materials regardless of cold material being added. When equipped with a Hand Spray Attachment, you have the latest in bituminous patch outfits.

No. 101 UTILITY SPRAY TANK—This Littleford unit combines three uses in one—has draw off for pouring pots—Spray Bar for major maintenance jobs and Hand Spray for patching. The No. 101 answers the need of Highway Engineers and Contractors for a Black Top unit with Utility.



TRAF-O-DOTS—These metal buttons give permanent marking facilities whenever used. They are sturdy and will stay in any surface. The Traf-O-Dots are used principally for pedestrian lanes, parking zones, curves, quiet zones, center lines for highways, etc. Traf-O-Dots are made of Stainless Steel, polished or unpolished.



TRAIL-O-DISTRIBUTOR—Highway departments or Contractors who have supply tanks can utilize their tank for spraying tar or asphalt by using the Littleford Trail-O-Distributor. This unit is the operating end of a Model "C" Distributor with all the modern features. Attached to a supply tank, it will operate as a distributor.

LIST OF PRODUCTS MANUFACTURED BY LITTLEFORD

PRESSURE DISTRIBUTORS
TAR AND ASPHALT KETTLES
UTILITY SPRAY TANKS
TRAFFIC LINE MARKERS
TOOL BOXES
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PAVING TOOLS
POURING POTS
POWDER MAGAZINES
SURFACE HEATERS
TOOL HEATERS
LEAD FURNACES
SUPPLY TANKS
SALAMANDERS
JOINT FILLERS
MORTAR BOXES
CONCRETE HEATERS
WEED BURNERS
PORTABLE WHEELED ROLLERS (MOTORIZED)
PORTABLE WHEELED ROLLERS (TRUCK OPERATED)

Wood Piles Protected By Concrete Jackets

(*Continued from page 2*)

handled the water and the cement. A Class Y concrete having a 1:1.9:2.8 mix was used, with a 3 to 5-inch slump. The concrete was designed for 3,500 pounds but ran consistently better. Nearby artesian well water was hauled to the bridge and dumped into a tank at the mixer. The contract called for no stopping of bridge traffic and the only delays that were required were when the men hauled the lighters out by means of ropes. The aggregate used was a washed river gravel, 95 to 100 per cent of which passed a 1-inch screen and most of which was ½-inch stone.

From five to eight batches were carried out in the lighters which had false bottoms to permit some accumulation of salt water in the bottom of the lighter without getting any into the concrete. The concrete was hand-shoveled to the forms which were permitted to remain in place 48 hours before removal. The semi-circular forms were latched together vertically by an ingenious triple latch controlled by a rod. The forms were thoroughly cleaned after every use and every third time were tallowed inside. The average production for an 8-hour day was 14 to 16 piles jacketed per day but, as the work progressed farther from the base, the number dropped to eight or ten. There were two lighters working on the concreting and one boat with two men placing and stripping the forms while one small boat was used for the men cleaning the piles. The form and lighter crews consisted of a foreman and two helpers. The sway braces were spiked, not bolted, back onto the bents after the jackets were completed, using 2 galvanized 8-inch spikes to each pile and were placed 2 inches above the top of the jacket.

During concreting the forms were lightly hammered with a wooden mallet having rubber ends to aid in consolidating the concrete and in sliding the forms down over the piles.

Personnel

This protective work was done by the Coastal Contracting Co. of Charleston, S.C., using the patented Hay method owned by P. D. Hay. For the contractor the work was in charge of two brothers, W. A. and J. E. Coleman, as Superintendents. The work was under the direction of the Georgia State Highway Department with Henry Wilson as Resident Engineer and James Fason as Assistant Resident Engineer.

New Diesel Engine

A new 200-hp diesel engine, Model ME-650, has just been announced by the Murphy Diesel Co., Ltd., Milwaukee, Wis. The design of this new unit conforms to that of the standard Murphy Model ME diesel. Injection is direct into a plain symmetrical combustion chamber and the injector and fuel pump are combined in one unit which is easily and quickly removed and replaced. There are no high pressure fuel lines and injectors can not become air bound.

Special care has been taken to assure cool operation and the pistons are oil-cooled under pressure, eliminating ring troubles and any need for special lubricating oils, according to the manufacturer. Four valves are provided for each cylinder, assuring maximum breathing capacity and rapid scavenging. Should the oil pressure drop below a fixed minimum pressure, the engine automatically shuts itself off. Control is through a single lever which permits easy and simple toggling-in for remote control. The unit is equipped with a standard 24-volt starter.

The ME-650 is available either as a bare engine or with radiator and full enclosure. Skids, outboard bearings and direct-connected generator units are also available. Complete information may be secured direct from the manufacturer by mentioning this magazine.

Bucyrus-Erie Co. Now Makes Ruth Dredgers

The Ruth Dredger Manufacturing Corp., Los Angeles, Calif., has entered into an agreement with the Bucyrus-Erie Co., South Milwaukee, Wis., under which the Bucyrus-Erie Co. has acquired the exclusive right to manufacture and sell Ruth dredgers. All patterns, drawings and the current inventory are being transferred to Bucyrus-Erie and henceforth all inquiries and orders should be addressed to them.

The Bucyrus-Erie Co. manufactures excavating machinery, including dredges, draglines and power shovels.

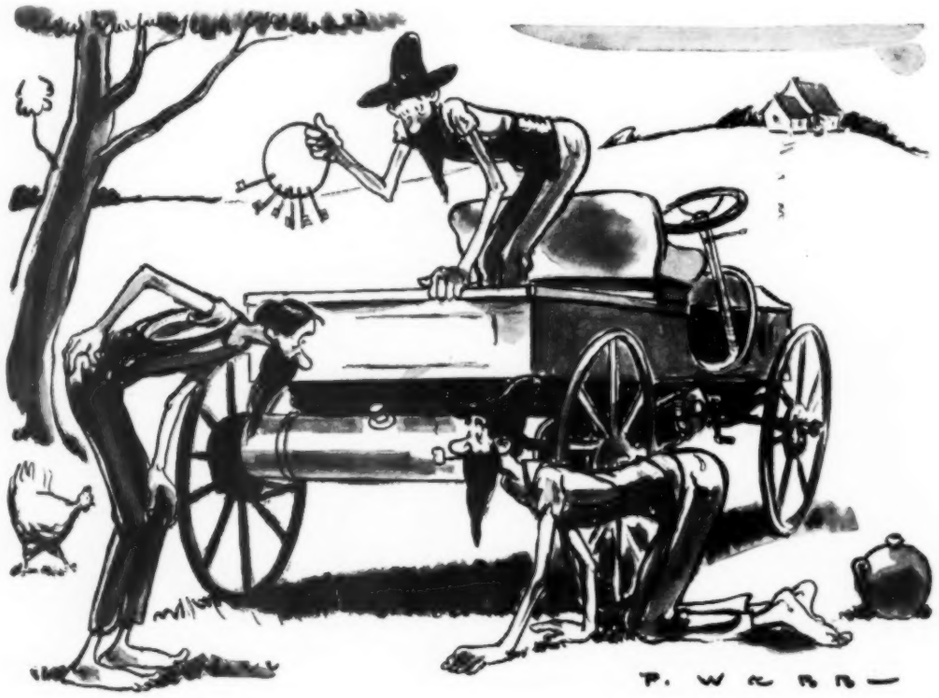
UNION SHAFT EQUIPMENT

● DEEP SHAFT MINE CAGES AND HOISTING SKIPS OF EVERY TYPE & CAPACITY

UNION SHAFT EQUIPMENT is designed for maximum safety. Materials are the best obtainable for the purpose. Safety devices for operation on wood or steel guides. We are prepared to make complete designs including shaft steel, head frames, bins, gates, etc.

One of four 8-cu. yd. dumping skips furnished Associated Contractors, Inc., for New York Board of Water Supply Contract No. 506. Hoisting and safety chains not shown.

UNION IRON WORKS, INC. P. O. Box 18, ELIZABETH, N. J.



"Willy, whar in tarnation is thet vapor lock?"

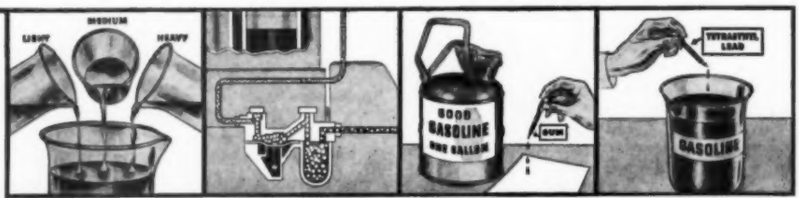
HOLD ON a minute, boys. Don't let a highfalutin term fool you. Keys won't help with vapor lock. And vapor lock isn't something you can normally see.

Vapor lock is caused by a stoppage in the fuel line due to bubbles formed by vaporized gasoline. Ordinarily a reasonable degree of volatility is desirable in gasoline. But when there are too many light ends or volatile fractions (which vaporize and become gases very easily), the inside of the fuel line looks like a freshly opened bottle of warm soda water. Eventually these bubbles become so numerous that they may stop the normal flow of gasoline through the fuel line and starve the carburetor. The resulting lean mixtures cause the engine to sputter and stall and make starting nearly impossible.

The way to avoid vapor lock is to check the vapor pressure characteristic of the gasoline you buy. Reputable refiners or marketers include this as one of the necessary specifications of good gasoline. They establish a vapor pressure which is low enough to prevent vapor lock except under the most unfavorable conditions. At the same time, good gasoline gives you balanced volatility, low gum content and high anti-knock value.

If you have any questions about bus and truck fuels, write the Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y., manufacturers of anti-knock fluids (containing tetraethyl lead) used by oil companies to improve gasolines.

4 RULES FOR GOOD GASOLINE



VOLATILITY should be balanced, for full power and best economy.

VAPOR PRESSURE should be adjusted to meet operating conditions.

GUM CONTENT should not exceed ¼ of a gram (4 small drops) per gallon.

ANTI-KNOCK VALUE should be high, at least 68 octane number.

THE BETTER THE GASOLINE THE BETTER THE PERFORMANCE

Pouring Single River Pier For New Hampshire Bridge

Combined River and Rail Grade Crossing Built by Lane Construction Corp. Near Plymouth, N. H.

✦ DURING the summer of 1938 a long overpass carrying U. S. 3 and N. H. Route 25 over the Boston & Maine Railroad and the Pemigewasset River between Plymouth and Ashland, N. H., was completed by Lane Construction Corp. of Meriden, Conn., using a novel set-up for the single pier in the river. The balance of the substructure for the 800-foot grade separation was poured by moving the 2-bag Jaeger mixer from abutment to pier on either side of the river and either chuting the concrete or handling with a crane.

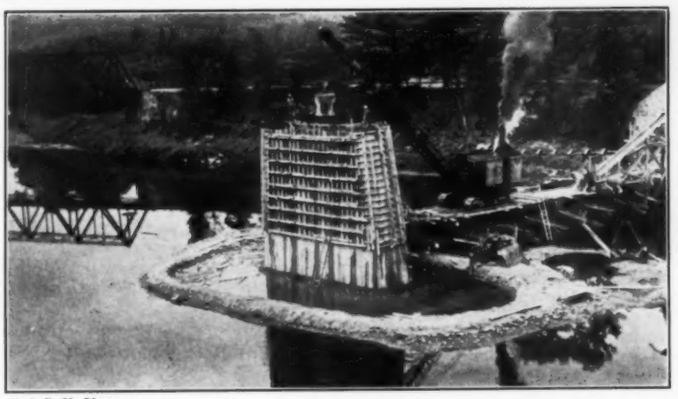
For the center pier a Bucyrus-Erie steam crane with a 50-foot boom was the major domo, handling every bit of the work from start to finish while sitting securely a few feet above the river on a heavy trestle. Grading for the job was started in mid-April and the superstructure completed and paved by mid-October, 1938. The contract called for the construction of two abutments, seven piers on the banks of the river and the center pier for four 40-foot and one 60-foot approach spans on the Plymouth side and two 40-foot approach spans on the Ashland side, and two 250-foot truss spans over the river. All piers were low, except the river pier, with high steel columns supporting the superstructure. This new structure replaces a steel truss bridge and a grade crossing about ¼ mile north of the new structure.

The 50,000 cubic yards of roadway excavation on the approaches was all done with one 10-yard and two 12-yard LeTourneau Carryalls. Some of the major quantities involved in the contract included: 105,129 pounds of reinforcing steel; 1,556,370 pounds of structural steel; 787 cubic yards of Class A 3000-pound concrete; and 595 cubic yards of Class B 2500-pound concrete. The bridge floor for the two truss spans is Carnegie I-Beam-Lok while the approach spans have a reinforced concrete deck. The entire bridge has a 2-inch pre-mix asphalt roadway 24 feet wide over the deck and steel floor 2 inches thick. The roadway approaches were paved with bituminous surface treatment A-1 consisting of a gravel surface with an application of bituminous material and blotted with sand.

The final work on the contract was the removal of the old structure, the steel being salvaged for the state and the old center river pier being demolished.

Construction of Center Pier

The first operation in the construction of the center pier was the erection of a sturdy pile trestle from the shore on the Plymouth side to the site of the pier. This was an eleven-bent trestle of five piles each, with each bent capped with 12 x 12's carrying triple 12 x 12 stringers on either side and 3 x 10-inch decking. The big Bucyrus-Erie steam crane was run down a ramp on the Plymouth side of the river and was used to build this trestle. Piles were driven and all timbers were handled by this crane which built the trestle as it moved out from the shore.



C. & E. M. Photo

Pouring the Center Pier on the Pemigewasset River Bridge near Plymouth, N. H.

Excavation for the pier was handled by the crane with a 1-yard Owen clamshell to 12 feet below the bottom of the river inside a 25 x 48-foot cofferdam of 25-foot lengths of mixed steel sheet piling. The sheeting was driven by a No. 7 McKiernan-Terry steam hammer handled by the crane. The coffer was pumped out with a new 8-inch Jaeger

(*Concluded on page 42*)

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KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Building Concrete Siphon Under Dry Gila River Bed

(*Continued from page 8*)

rowed with a plow. On this a compacted embankment, with 2 to 1 slopes and 50 feet wide at the top, was placed on the left bank of the canal and riprapped on the outside at a 3 to 1 slope and 3 feet thick at the top. A similar riprapped embankment, with a 30-foot top, was constructed on the right bank. Near the outlet, a loose fill was placed inside the left canal bank to bring it in to the 22-foot initial canal limit. For the final 400 feet of the contract the embankments were uncompacted but have a compacted lining 8 feet thick at the top, making the left bank 50 feet wide and the right bank 30 feet. Riprap was extended on the left outside slope to the end of the contracted section.

Water from the dewatering wells was piped wherever needed on the job, including an extensive borrow pit in the river break just east of the job. The hard gravelly hills were wet to a depth of several feet with sprinklers before excavating with one of the 2-yard Koehrings. This saved shovel teeth, which wore down unusually fast in the dry gravel, as well as speeding loading and putting into the material about all the moisture needed for compaction. Mack and Autocar 6 and 7-yard trucks hauled the material to the various compacted fills and embankments, including the compacted fills about the side walls of the inlet transition and the right wall of the outlet transition. In close places about the structures, the rolling equipment was supplemented by Ingersoll-Rand air tampers.

Reinforcing for Siphon

Reinforcing bars for the concrete structure ranged in size from ⅝ to 1¼-inch, usually spaced 10 inches. Portions of the top, bottom and sides had extra bars of 1⅛ or 1¼-inch size but most of the reinforcing was 1-inch. Wrought iron 3/16 x 8-inch water stops were installed at each construction joint, 30 feet apart. In order to support the inside steel form, the bottom mat of the invert was laid ahead and pyramid-shaped footings, 12 inches square at the top, with 1-inch anchor bolts embedded and threaded for cones, were poured, using metal forms. Concrete for this was mixed in a small mixer on the berm and poured down a metal gravity chute to wheelbarrows in which it was carried to the forms.

Template rings of 1-inch square rod rested on these footings, inside the reinforcing, until the latter was completed. The templates had two long braces of 1-inch rod welded in an A shape inside, with a welded horizontal rod of the same size connecting each to the ring. The templates were wired in place every 3 feet and were cut with a torch at the bottom so that they collapsed sufficiently for removal when the forms were moved ahead. They were rewelded for the next set.

C. M. Hill, subcontractor for the steel work, used a Lorain 40 crane equipped with a 40-foot extension on the regular 35-foot boom for loading and erection of steel. The extension enabled the machine to reach the siphon assembly from the bank of the excavation and was capable of handling as much as a ton with the boom horizontal.

The reinforcing bars were cut at the yard on a power shear and bent with an Alamo and Kardong power bender. Two White trucks were equipped with special flat rack bodies, 17 feet long, for hauling the steel about the job. A total of 15 men were employed on this steel work.

Aggregates and Concreting

Aggregate for the concrete, processed at an adjacent plant under another contract, were hauled in a Mack 7-yard and an Autocar 6-yard dump truck to bunkers at the job. Three Ford V-8 dump trucks with all-welded two-batch compartment bodies and Wood hoists hauled from the bunkers to a centrally located cement storage platform, where the cement was spread on the batches, and thence to the skip of the Koehring 27-E paver.

In pouring the inlet and outlet structures, the concrete was handled from paver to forms by a pour bucket on an 801 Koehring dragline. For pouring the barrel of the siphon, the paver was spotted on the right berm and 30 feet of barrel poured daily. The bucket of the paver, moving out on its steel boom, released the concrete into a loading hopper at the runway to the forms. From here the concrete was taken in rubber-tired buggies and dumped into the hopper tops of the metal pipes used to place the concrete in the forms. Airco cutting and welding torches were used to shorten or lengthen these pipes as required. The concrete was consolidated

(*Continued on next page*)

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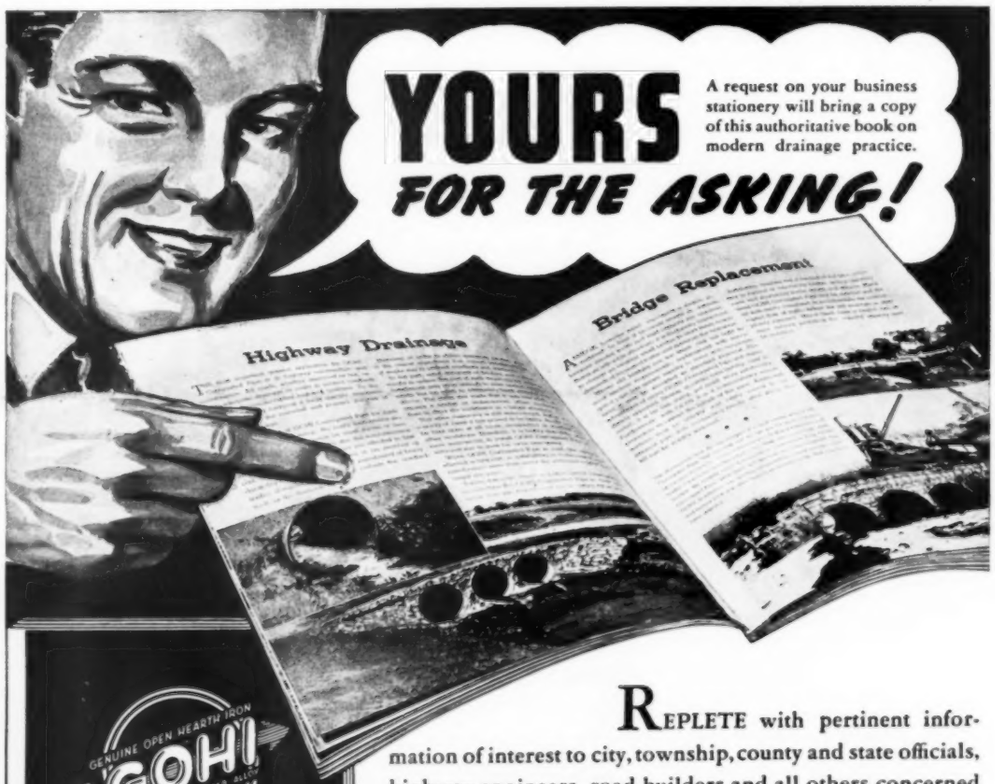

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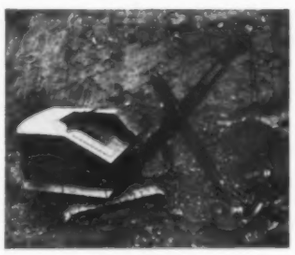

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MARION OHIO

J. B. Stringfellow's Bucyrus-Erie 20-B Loading Rock in the Quarry

Monolithic Structure Built Under Dry River

(*Continued from preceding page*)

with Viber internal vibrators, supplemented by spading. The concrete was covered with burlap and kept wet for two weeks.

Two 8-hour shifts were used, the morning shift excavating, placing steel, setting forms, etc., and the afternoon shift pouring concrete. Wooden forms were used generally, although two 30-foot sections of steel inner forms, mounted on a jumbo, were used for the barrel, with one 30-foot section of steel outside forms also moving along on rails.

A line of 20-foot sheet piling, driven as an anchor for the barrel along each side of the sub-base, proved a decided help in preventing spreading and settling of the outside forms. Air pressure, furnished by two portable Ingersoll-Rand compressors, was used in the McKiernan-Terry pile-driving head which was suspended from the boom of a Koehring dragline. After the piling was driven, the sub-base was shaped and compacted by hand, using Ingersoll-Rand tampers. A 1 x 12-inch bolt, imbedded in the concrete base of the barrel, connects with the top of each piling.

Quarry and Rock Fill

A quarry was opened by J. B. Stringfellow, subcontractor on the rock work, in some low granite ridges east of the river bottom, to furnish rock for riprap and for the fill around the siphon barrel. The ridges were drilled in lifts, to a maximum depth of 24 feet, using three Ingersoll-Rand 79 Jackhamers with Crusca steel and Timken bits. Holes of maximum depth were ordinarily spaced about 14 feet apart. Hercules explosives were used, the holes usually being sprung three times before the final loading. For this purpose, the powder man preferred the "free-flow" bag powder, when available. When using stick powder, 6, 25, and 75 to 100 sticks, respectively, were placed for each chambering. In the harder rock and deepest holes about four boxes of black blasting powder was used for the final loading. The tamping dirt was carefully screened, especially when springing holes.

Some trouble was experienced, particularly in secondary blasting, with openings in the seamy granite. The drillers were instructed to notify the powder man of any such cavities through which they drilled so that they could be built up with sand to save explosives. The blasts were comparatively small, 50 holes or less, and breaking up to 2,500 or 3,000 yards at the most. A Hercules blasting machine was used to fire. One or more pop shots were used in breaking up large boulders, as the rock had to be under ½ yard in size (minimum 1/10 cubic foot). Air was furnished by a Sullivan portable compressor.

The rock was loaded with a Bucyrus-Erie 20-B shovel into three GMC and one Chevrolet 4-yard dump trucks, all of which burned butane gas. An Allis-Chalmers tractor equipped with a bulldozer leveled off at the fills.

A rock fill was placed about the siphon barrel with a slope on the left of 3 to 1 and was leveled from the center line to the right excavation bank. The surface is flush with the siphon top, except near the inlet structure, where it thickens to a minimum of 4 feet over the barrel. At each end, the riprap of the canal slopes connect with this rock fill, over which 4 feet of backfill was placed with the Caterpillars and bulldozers.

Equipment Maintenance

A P & H portable welder was used at the contractor's shop for building up bucket teeth and the sheepsfoot rollers as well as for many other repair jobs. When the roller teeth became worn, they were trimmed off with a Victor cutting torch and 1½ x 3-inch blocks of plow steel arc-welded on with No. 5 Fleetweld rod in 3/6 and 5/32 sizes. Another P & H-Hanson welder, mounted on a Chevrolet truck which also carried

(*Concluded on page 43*)

Manufactured by
HETHERINGTON & BERNER, Inc.
INDIANAPOLIS, IND.

PORTABILITY and CAPACITY
COMBINED IN THE NEW MODEL P-A PORTABLE ASPHALT MIXING PLANT
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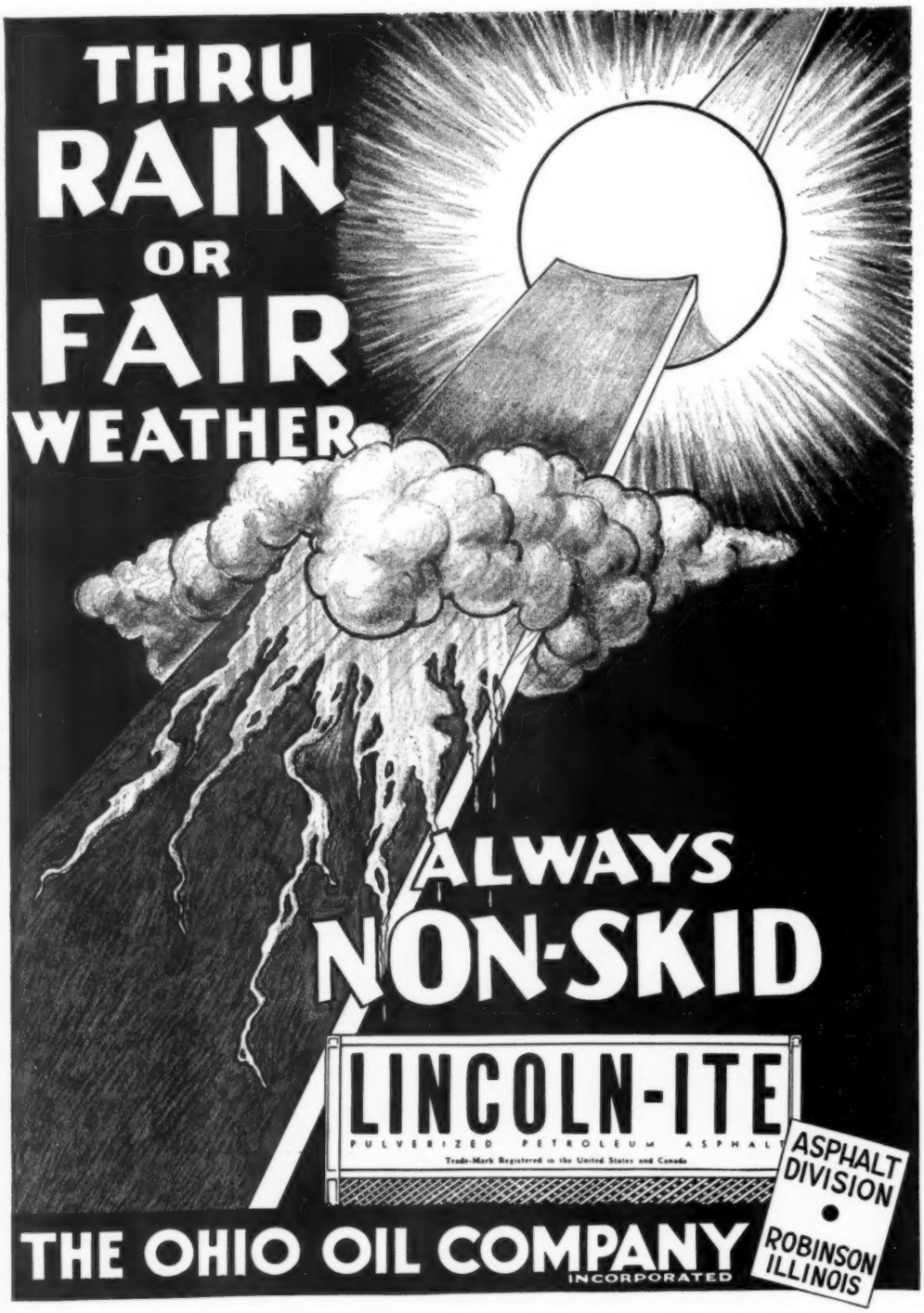
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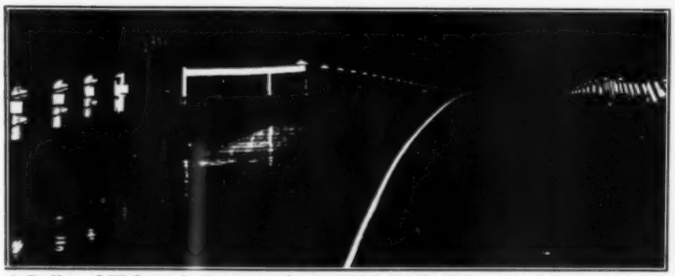

A Section of Highway in Pennsylvania On Which Traffic Stripe, Guard Rail Posts and Signs Have Been Treated by the Prismo Process

New Road Markings Used in Pennsylvania

U. S. 322 and 422 in Pennsylvania have recently been given a treatment to prevent accidents by a new method of illumination. The lights of passing cars actually provide the illumination which is reflected in millions of microscopically small glass spheres which have been imbedded in the paint of traffic stripes, guard rail and signs along the highways, so that the upper half of each sphere acts as a tiny lens to reflect the light back to its source, without glare or discomfort. It is stated that these miniature spheres make road warning signs visible for more than 1,000 feet and that in rain, fog, or haze, they glow luminously and constantly, defining curves, hills and danger spots clearly.

The various methods of so treating traffic lines, warning signs or entire structures such as bridge abutments, pier heads or shoulder posts, styles of signs, charts of performance and tests are described in special bulletins by the Engineering Department of the Prismo Safety Corp., Huntingdon, Penna. Copies of this profusely illustrated literature on the reduction of accidents by the proper instruction and night guidance of motorists may be secured by state and county highway departments direct from Prismo or from this magazine.

New Screening and Crushing Equipment

Among the 1939 Pioneer screening and crushing equipment are the new tandem double-eccentric vibrating screen and the 54-V crushing, screening and loading plant. The new mounting of the 4 x 22-foot vibrating screen makes it possible to operate two inclined vibrating screens in tandem, one power unit serving both screens. This screen is triple deck and will produce six sizes simultaneously.

The Pioneer 54-V plant, mounted on pneumatic tires with brakes, consists of a 1536 primary jaw crusher, a 4 x 12-foot 3½-deck screen, a 54 x 24-inch roll reduction crusher, and a return belt-conveyor system. All conveyors are of the heavy-service type and are mounted on low-mast trailer trucks for easy portability.

Complete details on these two new units, as well as on the remainder of the Pioneer line of screening and crushing equipment, may be secured by interested contractors and state and county highway engineers direct from the Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn., by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

New Type Chain Hoist

Changes in spur gear chain hoist design have been incorporated in the new Coffing Power Master controlled gravity lowering chain hoist, according to a recent announcement by the Coffing Hoist Co., Danville, Ill. Among the features of this new hoist is the controlled gravity lowering, by which the lowering speed is controlled by a clutch and governors, positive in action, and the load may be stopped at the fractional part of an inch. Another feature is the free chain for quick up-or-down load chain adjustment. When there is no load on the hoist, pulling down on the right side of the hand chain permits the load chain to be adjusted to the load without waste motion. The hoist is equipped with lubri-sealed ball bearings, with the planetary gear system sealed and running in oil.

The Power Master, which is equipped with special Diamond chain, is built in capacities ranging from 1 to 8 tons, with unit weights of 86 pounds for the 1-ton and 169 pounds for the 8-ton model. Complete information on these new hoists may be secured direct from the manufacturer by mentioning this magazine.

Is your job ever held up because of breakdowns? Keep your equipment up-to-date. Write for information.

New Rubber Goods Dealer

Moty & Van Dyke, Inc., of Klamath Falls, Ore., has recently been appointed distributor in the Pacific Northwest for the line of mechanical rubber goods made by the New York Belting & Packing Co., Passaic, N. J. In addition to its main office at Klamath Falls, this company maintains branches at Bend, Ore.; Lakeview, Ore.; and Alturas, Calif.

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DIESEL GASOLINE STEAM ELECTRIC

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Here's the "brains" of your tractor tool operation—as well as the brawn. We don't mean to cast reflections on the "cat-skinner." Contrarily, he knows best what it means to have a powerful, trouble-free LeTourneau Power Control Unit work with him . . . his production shows up better.

When he angles his outfit he's *sure* the lower deck of fair-lead sheaves are automatically going to keep the cable aligned straight to the equipment. When he winds in more cable all his attention is on doing *his* job right—the upper deck of self-reeving sheaves spool the cable evenly on the drum . . . with never a thought to cable distortion. It's always protected from "piling" or rubbing on stationary parts —*all ways*. Grooved steel sheave wheels prevent flattening, for they give *three-way* cable support—bottom and two sides.

One thing he doesn't know—yet: *interchangeable* line speeds are available in the new standard LeTourneau Power Control Unit—the Model "T". It requires changing only two gears in the detachable "neck" assembly. Remove a few case bolts . . . make a quick change . . . and *again* it's a perfectly engineered unit for the line speed that best suits his job demand. Reduction ratios range from 7.9:1 to 38:1 . . . with all speeds in between available. Entirely new in power unit construction are the herringbone gears in this "neck." They're quieter and smoother in operation, with one-third greater tooth strength (see inset).

Adding further to smoother operation is a *roller-bearing* mounted throw-arm on an automatic positive brake assembly. A flick of the control lever to neutral . . . and a vise-like grip is applied evenly to the drum. Yes, all the "chatter" is gone, which means long lining life. *Thirty* roller bearings—one at *every* bearing point—throughout the LeTourneau Model "T" Power Control Unit steady its operation to clock-like precision.

With all this, not a pound of weight has been added. Why, it's lighter than "units" that are merely winches and offer none of these advantages . . . for LeTourneau Power Control Units are *all-steel*, with case-hardened gears. More expensive —by far—to build, but you won't find it on the price tag.

Tractors thus equipped give a new versatility—for the same Power Control Unit operates any LeTourneau hauling, digging or lifting tool. Your "Caterpillar" and LeTourneau dealer will show you and your men right on your job what money-saving operation really means. R. G. LeTOURNEAU, INC., Peoria, Ill., Stockton, Calif.

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POWER CONTROL UNITS

to operate CARRYALL* SCRAPERS, ANGLE-DOZERS*, BULLDOZERS, ROOTERS*, BUGGIES*, DRAG SCRAPERS, PUSHDOZERS, CRANES, TREEDOZERS.

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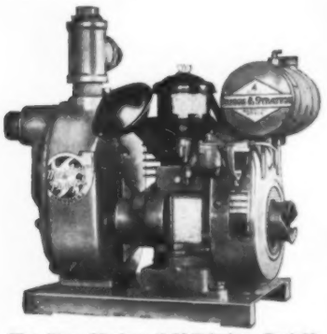

The New Marlow Self-Priming Centrifugal Pump

New 1½-Inch Pump

A new 1½-inch self-priming centrifugal pump, guaranteed for a suction lift of 25 feet and a total head of 55 feet, has just been announced by Marlow Pumps, Ridgewood, N.J. This pump is of the self-cleaning type, with an open impeller of bronze. A special grease seal replaces the old packing gland.

The unit is available in either cast iron or aluminum and is powered with a 1-hp Model IBP Briggs & Stratton engine complete with oil-type air cleaner, speed changer, magneto, float-feed carburetor, and large capacity oil base with oil pump.

Complete information on this new pump may be secured direct from the manufacturer by mentioning this magazine.

New Skip Hoist

A new patented skip hoist which uses wire ropes instead of rigid rail guides, made by the Skrainka Construction Co., 7173 Delmar Blvd., St. Louis, Mo., is claimed to have saved 75 per cent on operating costs at its Big Bend Quarry. On this work it is handling up to 1,000 tons per 10-hour day in a pit 200 feet deep, according to the manufacturer.

A reciprocating hoist is used. Skips are connected by a steel cable and counterbalance each other, each skip tripping and dumping automatically at the crusher. Two 1-inch guide cables for each skip are anchored by bolts to the quarry floor on a slope of 1½ inches per foot. The features of this type of hoist are its low cost because of the elimination of expensive framework; it can be designed in any capacity, depth or slope; and its reach can easily be adjusted merely by lengthening or shortening the cables.

Literature describing this hoist in detail may be secured direct from the manufacturer by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

International Harvester's Modernization Program

The International Harvester Co., Inc., Chicago, Ill., has announced a plant modernization and new construction schedule involving the expenditure of about $12,000,000, which includes outlay for improvements to the plants at Rock Island, Ill., and Milwaukee, Wis., $1,000,000 for new construction in the motor truck engine plant at Indianapolis, Ind., and $3,000,000 for modernizing its tractor works in Chicago.

The changes at the tractor works were inaugurated last year with the construction of a factory addition for the manufacture of crawler-type tractors. This year new machinery is to be purchased, existing machinery rehabilitated, and the entire plant rearranged so as to obtain greater plant capacity and manufacturing efficiency.

At the Milwaukee plant the new program includes a complete rehabilitation of the foundry to equip it for specialization in the manufacture of large castings, and the laying out of factory space preparatory to the manufacture of two new sizes of diesel engines for the International diesel line. Both diesel engines are smaller than the engines now made by this company. These changes fit into the company's long range program to develop the Milwaukee plant as a large diesel engine and tractor manufacturing plant.

Portable Generators For Contractors' Use

Portable electric generators that can be moved easily by one man in one hand, leaving the other free to carry a floodlight or electric tool, are a great aid to contractors. Homelite portable generators, which are made in a variety of sizes, both direct and alternating currents, are used by contractors to provide current for floodlights at stockpiles, for trench work, for emergency lighting of repairs at night, or the inevitable finishing which must be done after dark in the fall on concrete roads, for lighting field offices and for operating many electric hand tools such as drills, saws and hammers.

Bulletin No. 200B, recently issued by Homelite Corp., 45 Riverdale Ave., Port Chester, N. Y., describes the complete line of Homelite portable gasoline-engine-driven generators from 650 to 3,000-watt on the direct current units and from 500 watts to 2,500 watts on the alternating current units.

Interested contractors and state and county highway engineers may secure copies of this bulletin free from the manufacturer or from this magazine.

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PURPLE-STRAND *FORM-SET* WIRE ROPE

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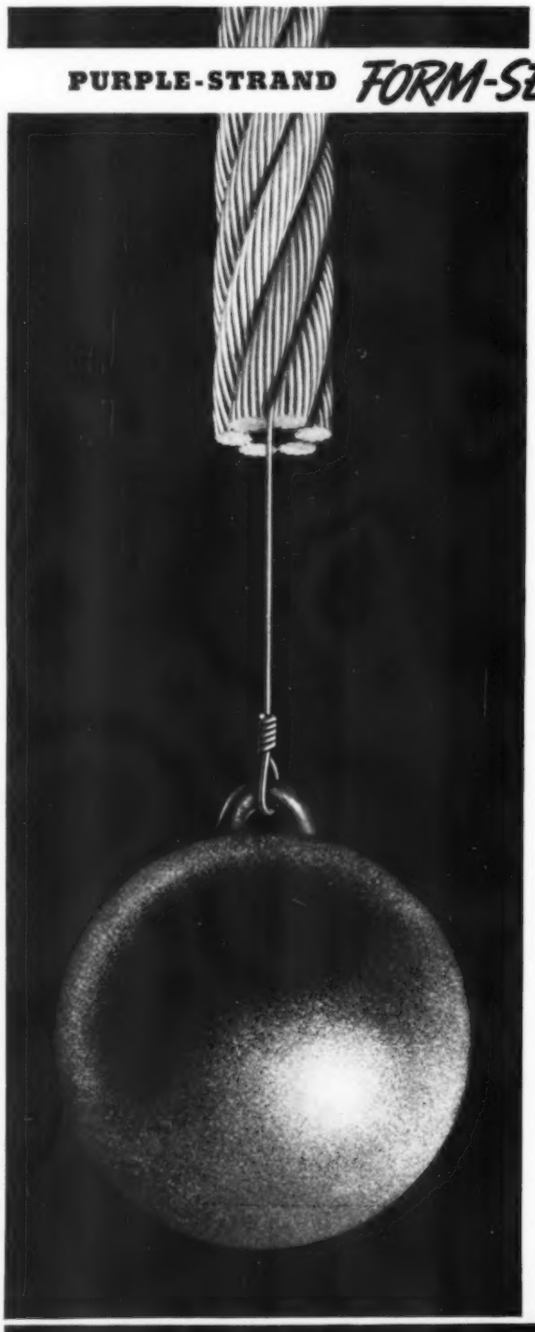

Made of premium-price extra-tough steel

EVERY pound of steel that goes into Purple-Strand rope would command an extra price on the open market, for extra care and extra time are required in steel-making departments to produce this metal. Special furnaces, reserved for the out-of-ordinary job, are used. Special practices, carried out under strict metallurgical observation, are observed at these furnaces, at the soaking pits, and in the rolling mills.

The result is a superior steel, the first requirement for superior rope. This steel, drawn into wire, has more than four times the strength of structural steel. It has a toughness far exceeding any ordinary steel. Its fatigue resistance is exceptional. And above all, because of close control and a strict schedule of testing, these qualities are the same in mile after mile of wire.

Purple-Strand quality, however, does not end with the premium-price steel. Every step in the making of a Purple-Strand wire rope involves extra skill and attention. For example, design has been perfected until this line is a real precision machine. Lubrication has been studied and special lubricants developed. Every conceivable step has been taken to make Purple-Strand Form-Set the finest wire rope money can buy.

Bethlehem wire rope is available through distributors. Write Bethlehem Steel Company, Bethlehem, Pa., for the names of wire-rope distributors in your vicinity.

BETHLEHEM STEEL COMPANY

Increasing Life of Dredge Cutter Blades

Hard-Facing Makes It Possible to Handle Hundreds of Thousands of Yards Without Renewal of Blades

(*Photos on page* 44)

✦ THE effective life of suction dredge cutter heads has always been figured in thousands of cubic yards of material moved but, with dredging now one of the most important methods of moving very large quantities of earth, just thousands of yards is not enough.

The principal reason for cutter head renewal is wear from the abrasion of the material the dredge is handling. In some cases, especially on rocky bottoms, teeth may be broken off, or great nicks made in the blades by large boulders. Thus the requirements for best performance in a cutter head are, first, wear-resistance and, second, strength and toughness. Manganese steel has proved to be a good blade material where wear is insufficient to require hard-facing materials, but other steels are often used when hard-facing is necessary. The choice of hard-facing material depends to a great degree upon the particular work, and it is difficult to predict the proper choice without a test on the job. However, a few general rules can be laid down to assist in conducting such tests.

Types of Metal for Blades

In silt, loose sand or loam, where it is known that no boulders are present, the most wear-resistant material can be used, without danger of breaking. For this purpose, tungsten carbide diamond substitutes are especially suitable. These materials have proved to be very economical on dredges along the Pacific Coast where they encounter a "cemented sandstone" formation which is particularly abrasive. However, the extreme wear-resistance of these materials is gained by some sacrifice in toughness, and they are not always successful in rocky material or where the cutter head is subjected to considerable shock.

At the other extreme, for use in boulders or blasted rock, the best hard-facing material is one possessing a considerable degree of toughness to guard against breakage. A tough ferrous alloy, such as an impact-resisting alloy of chromium, manganese and iron, is generally satisfactory for this service. Materials best for intermediate applications, where the material dredged contains some rock or boulders in a sandy or clay bottom, are extremely difficult to select without a field test. However, there are several materials available for this type of service, among them the cobalt-chromium-tungsten alloys.

Hard-facing materials are applied to the steel base metal either by a modified oxy-acetylene welding process or, in the case of manganese steel cutter heads, by the electric arc welding process. Depending upon the alloy to be used, the details of welding may be slightly different but, in all cases, the only equipment required is the welding outfit and the hard-facing rod. No subsequent heat treatment is necessary.

Some Examples of Hard-Facing

An example of the improvement in service life made possible by the use of a ferrous hard-facing material for cutter blades cutting under conditions of impact is the record of a dredge used in Wolf River, Tennessee. Formerly, four to eight months' service was the usual run. After hard-facing the blades with chromium-manganese-iron alloy, the life was considerably extended. After one cutter head had been in continuous service for thirteen months, it was inspected and found to be good for another ten months of 24-hour a day service.

Another dredging cutter used in a South American harbor for underwater excavation of a mixture of sand, gravel, mud and clay gave ten months' service before repair was necessary. This cutter removed 570,000 cubic yards of materials, yet the cutter which it supplanted had worn out in six weeks after dredging only 80,000 cubic yards of material. In this case, the hard-faced cutter was coated with 150 pounds of cobalt-chromium-tungsten alloy and, although this increased the initial cost about three times, it increased its life seven times.

A Miami dredging company found that hard-facing the edge of dredge cutter blades increased their life from five weeks to twelve weeks. One and a half pounds of Haynes Stellite hard-facing alloy was applied to each blade in less than half an hour. At only a fraction of the cost of a new cutter, the hard-facing process increased the life of the blades almost two and a half times.

Composite rods, containing crushed and screened particles of cast tungsten carbide in high-strength steel binding material have also been used on blades for service where impact is moderate but abrasion severe.

Hard-facing has assumed an important role in many industries for protecting wearing parts and it has a definite place in increasing the life of construction equipment subjected to wear through abrasion. The economies of actual operation, with the substantial savings in shut-down and replacement time, and greater efficiency due to sustained sharp edges of hard-faced blades, are the advantages offered by the use of this treatment of cutting equipment.

COMPLETE
WELL POINT SYSTEMS
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Faster—More Economically
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"TIP TOP" IN EVERY WAY

"YOU'LL be interested in our experience with your Cletrac new Model F Diesel drawing a 12 yard hydraulic scraper," writes one Cletrac owner. (Name on request.)

"During one month in which we worked the outfit approximately 200 hours, we moved 25,000 cubic yards of pay dirt or an average of 125 yards an hour.

"On an especially easy cut of 5,000 yards, which we moved in exactly 35 hours, the average was 140 cubic yards of pay dirt per hour.

"The haul in the first instance was 500 feet; in the second, 200 feet. Your outfit is 'tip-top' in every way."

Cletracs do not "turn on a dime," but note the short turning radius through Controlled Differential Steering.

This Cletrac Diesel of 95 h. p. handles a twelve yard scraper with ease. Fuel consumption is remarkably low.

Two 94 h. p. Cletracs with bulldozers move full blades of dirt. Cletracs handle easily—are back for another load in a hurry.

WHETHER operating under "easy" conditions or "tough" going, every feature of Cletrac design and construction is planned to give "tip-top" performance every hour—every day.

With electric starting, for example, Cletracs are on the job faster in the morning.

Cletracs are properly balanced without unnecessary weight. The weight saving alone means as much as 19% greater pay load on a 30% grade.

Cletracs are "tip-top" for another reason—Controlled Differential Steering. This feature—exclusive with Cletrac—keeps both tracks pulling at all times. There's no loss of power by stopping one track. You handle larger loads on the turns... maneuver the tractor more easily... turn more smoothly.

It's Cletrac "tip-top" performance capacity, economy and dependability that keeps difficult jobs on schedule and earns bonuses on the easier ones.

Best of all, there's a Cletrac size and model from 14 to 95 horsepower—either gasoline or Diesel—to fit any job. You can choose the right size for your operations. Ask the nearest distributor for an on-the-job demonstration.

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CLEVELAND, OHIO
Cletrac
Crawler Tractors
Built To Endure
14-95 HORSEPOWER • GASOLINE OR DIESEL

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For Bridge, Building, Paving, Pipe Line, Highway, Sewer, Water and Railroad Construction and Maintenance.
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116-126 Tenth St. Brooklyn, N. Y.

Revised A.I.S.C. Manual

The American Institute of Steel Construction has just issued the second printing of the third edition of the Manual of Steel Construction. The second printing of this handbook for engineers and builders contains some minor revisions, among which are: personnel changes in the Technical Advisory Board; minor changes in text regarding structural tees; the addition of a table of dimensions and properties of H-piles; revisions relating to camberings of rolled beams; revisions in rolling and cutting tolerances, camber and sweep; and revisions in the section modulus tables.

Copies of the Manual may be secured direct from the American Institute of Steel Construction, 200 Madison Avenue, New York City. Price: $2.00.

New Electric Hand Saw

A new descriptive folder on the new Porter-Cable 10-inch Speedmatic electric hand saw has recently been issued by the Porter-Cable Machine Co., Syracuse, N. Y., which will be glad to send copies on request to readers of this magazine. The new saw has several features, including helical cut gears, a blade speed of 4,000 rpm, even distribution of weight making it easy and comfortable to use in one hand, and the blade placed in a safe position, away from the operator and directly in line with his eye while working in a normal position.

Like other Speedmatic saws, this new model can be used on the radial arm unit, made by Porter-Cable, which provides a universal type cut off and rip machine.

New Bucyrus-Erie Dealer

The Bucyrus-Erie Co., South Milwaukee, Wis., has announced that the Gulf Tractor & Equipment Co. of Houston, Texas, will represent it in that territory and will handle Bucyrus-Erie shovels, draglines and buckets, clamshells, lifting cranes and drag shovel-ranging from the ⅜-yard to 2¼-yard size.

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You can reach this Special Asphalt Representative through any local Standard Oil (Indiana) office or by writing 910 S. Michigan Ave., Chicago, Illinois.

Asphalt for every purpose STANDARD OIL COMPANY (INDIANA)

Problems of Paving New York Fair Site

(*Continued from page* 19)

Concrete Pavement

The only cement concrete road constructed by the World's Fair is a part of the intra-mural bus route running adjacent to the Grand Central Parkway to the East through the Exhibit Area and in the region of greatest consolidation of the old ash fill. This road consists of about 10,000 square yards of reinforced concrete pavement and was built in accordance with the New York State Highway Specifications for the adjacent Grand Central Parkway construction. The concrete slab is 8 inches in thickness reinforced with clipped bar mats. Blaw-Knox forms and finishing machine were used. For the mixing a Koehring paver was used with batched materials and bulk cement. This contract was executed by the Harlem Contracting Co., Inc., of New York.

Paved Floors in Buildings

Another paving operation consisted of the construction of bituminous paved floors in large exhibit buildings. The problem of paving these buildings, which have areas of several thousand yards each, was given much study. Any form of supported floor involved construction difficulties in buildings liable to settlement, and heavy expense. Cement concrete laid directly on the subgrade was inadvisable because of its lack of flexibility and the difficulty of patching should repairs become necessary. These buildings had to be paved before arrangements were completed for the rental of space to exhibitors, and it was impossible to provide for the unknown requirements for subsurface utility connections in any way which would avoid subsequent necessity for pipe laying under the floor. All factors involved, such as cost, flexibility under slight settlement, and the facility with which cuts could be made and repaired when it became necessary to install underground pipes, led to the choice of bituminous macadam.

Building-floor paving comprises a 1½-inch compacted bituminous binder course and a 1-inch compacted bituminous top course on a 2-inch mat of stone screenings. As in the case of street paving, the subgrade was shaped and rolled, the 2-inch mat of stone screenings laid directly upon it and rolled again. It was found that the use of the stone screenings provided a more uniform base for the asphalt macadam top and reduced the possibility of waves in rolling the binder and top course. This is particularly important in a building floor which must present as nearly as possible a perfectly plane surface.

The top course consists of a fine stone and sand mixture, all of which passed a ¼-inch sieve, with 6 to 9 per cent of asphalt, and 7 to 9 per cent of limestone dust. This type of flooring was installed in twenty of the Fair buildings by the Highway Improvement & Repair Co. of Brooklyn, New York, which company also executed one of the earlier contracts for street paving.

Conclusion

The above described types of pavement comprise a satisfactory selection for World's Fair use and in view of the experience already had, other more expensive pavements would not have been justified, nor would they have given as satisfactory results. The first paved streets were constructed by the MacDonald Company in the summer of 1937 and have been in use for heavy traffic continuously since that time. This included large construction equipment, shovels, cranes and tractors, trucks with building material and other excessively heavy loads. The present appearance of these roads is satisfactory and few repairs have been necessary. All roads built subsequently have been opened to traffic after laying the binder course, which permitted development of any points of weakness in the subgrade as well as the making of necessary street openings before placing the final wearing surface.

Accidents on Road Jobs

Sixty-one fatal accidents on road construction jobs occurred as follows, according to the National Safety Council:

Run over by trucks	10
Sliding earth or rock	9
Fell from moving trucks	8
Struck by moving parts of machines	5
Struck by passing vehicles	4
Struck by falling objects	4
Trucks overturned	4
Electrocuted	4
Crushed between trucks or between trucks and other objects	3
Infections from injuries	3
Explosives	2
Caught under steam shovel	1
Gasoline ignited while fueling power shovel	1
Explosion of asphalt mixer	1
Fell from tractor	1
Thrown against motor of crusher	1

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SOUTH BEND, INDIANA

LONGER BOOMS

MORE LIFTING CAPACITY

LOWER GROUND PRESSURE

-than any other dragline of its size

You'd have to buy the next larger capacity of any other dragline to match these important P&H advantages common to P&H Models 855 (2 yd.) and 955 (2½ yd.)

P&H makes these advantages possible through rigid, welded construction of alloy steels, proper weight, balance of upper structure and liberal Diesel power. Synchronized motions controlled by split-second clutches and larger brakes make these P&H's the smoothest-running 2 and 2½ yard friction machines ever built.

P&H EXCAVATORS 18 Different Sizes

Write for literature on the size and type that interests you. Harnischfeger Corporation, 4419 W. National Avenue, Milwaukee, Wisconsin.

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EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

The New I-R Model 210A Portable Air Compressor

New Line of Two-Stage Portable Compressors

A new line of two-stage air-cooled portable compressors, in which a number of improvements have been incorporated, has been announced by Ingersoll-Rand Co., 11 Broadway, New York City. These machines are available in five sizes for actual capacities of 85, 105, 160, 210 and 315 cfm at 100 pounds pressure. Power is furnished by a Waukesha heavy-duty industrial-type gasoline engine or by an Ingersoll-Rand Type H oil engine.

One of the features of these new compressors is their streamlining, with low center of gravity and smooth lines. Another feature is the bell housing connection used on all sizes, making the compressor and engine practically one unit. The entire assembly is mounted on a sturdy pressed steel frame. The air intake is now on top of the roof, and a stronger sectionalized radiator, with improved construction of the sections and more rigid mounting, is furnished. Thermostatic control replaces the adjustable curtain and automatically assures the correct cooling-water temperature for the engine. The air receiver and fuel tank are conveniently located, the latter being lead-coated, easy to fill and large enough for one day's supply.

The compressor is an air-cooled two-stage machine, with two low-pressure cylinders for each high-pressure cylinder. The new models also have the patented I-R channel valves introduced several years ago for stationary compressors. Complete details, including a two-page chart for selecting the proper size of compressor to operate various air tools, are contained in a new 32-page booklet, Form 3364, copies of which may be secured direct from the manufacturer.

Two New Arc Welders

Two new arc welding units, one a 150-ampere direct-current unit and the other a 100-ampere alternating-current model, have recently been announced by the Wilson Welder & Metals Co., Inc., Lincoln Bldg., New York City.

The new d-c unit has a rating of 150 amperes at 25 volts and a range of adjustments from 20 to 200 amperes at 25 volts. Current control consists of a three-point current switch and a dial rheostat control for fine adjustment. Open circuit voltage is from 40 to 75 volts and the set uses electrodes up to 3/16 inch in diameter. This new welder, which is sturdily built for continuous production service, is available in a portable model equipped with strong rubber-tired casters, and in a stationary model. The manufacturer states that this new welder provides a steady arc and quick voltage recovery and that it welds without current surges and without losing the arc when welding thin sections.

The a-c model, with a rating of 100 amperes at 30 volts, is designed for light sheet-metal welding and other light work requiring low current and fine control. It is designed especially for use with heavily coated electrodes. A calibrated scale on the front of this welder indicates the adjustment throughout the range of the machine, which is from 25 to 150 amperes. This adjustment is made continuously by rotating a crank at the top, and because the current is not broken there is no need to stop operations and open any connections while a change is being made. Enclosed in a sheet metal housing 14 inches in diameter and 22 inches high, this new welder is a compact and mobile unit, designed for complete safety and durability.

Complete information on these two new welders may be secured direct from the manufacturer or from CONTRACTORS AND ENGINEERS MONTHLY.

Easier Loading at a Flat Digging Angle with BAKER HYDRAULIC SCRAPERS

Baker Hydraulic Scrapers load easier, with less power, which means greater yardages at lower costs. Sizes for 20 h.p. tractors up. Write for latest bulletins.

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Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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If you start reaching for the red ink when it comes time each month to tally up your hauling or delivery costs, it's time to change to Fords. The 1939 line of Ford V-8 Trucks and Commercial Cars hits high hauling costs right between the eyes. These modern units are built to give you the over-all economy that's so important in keeping costs down.

Any way you figure it, Ford performance adds up to money-saving performance. The original price tag is low. Insurance and license fees are low. Operating and up-keep costs are low. And so is depreciation.

On top of these savings, Ford gives you the tough, rugged construction that defies hard service — keeps your truck on the job.

Why not see how a Ford Truck fits into your hauling picture? Get in touch with any Ford dealer, and ask about an "on-the-job" test that will give you the facts before you buy.

CHECK YOUR TRUCK AGAINST THESE QUALITY FORD FEATURES!

- ***V-8 Engines*** — 95, 85, 60 hp. Smooth, dependable, low-cost power. Quality materials and precision workmanship for efficient operation and long life.
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- ***Full Torque-tube Drive***—Springs relieved of driving and braking stresses provide better cushioning of truck and its load. Shackle-bolt wear reduced, spring life prolonged.
- ***Rugged Rear Axles*** — Driving pinion is straddle-mounted to maintain gear tooth alignment. All truck axles are full-floating, with weight carried on axle housing — none on axle shafts. These features increase dependability and long service, reduce up-keep expense.
- ***Big, Powerful Hydraulic Brakes*** — Equalized braking action for straight stops. Big brake drum diameters and large lining areas for long brake life, low maintenance.

In every detail, the quality of all Ford cabs and bodies matches the high quality of Ford chassis. Their exceptional durability means long service with low up-keep cost.

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The Come-Along Pulling Tool

All-Purpose Pulling And Hand Power Unit

The Come-Along, a handy all-purpose pulling tool recently announced by the J. E. Shaffer Co., 621 East Cameron St., Tulsa, Okla., may be used for hoisting heavy loads, lifting pumps out of wells, pulling trucks or other equipment out of mud holes, tightening guy wires, pulling out stumps, handling engines, motors, etc., handling heavy parts for repairing machinery, pulling posts, and moving buildings.

The unit is simple in operation and, with very little practice, loads can be handled quickly and efficiently, according to the manufacturer. The unit is furnished with 5 feet of ⅜-inch steel chain with an oversize grab hook on one end, so that it can be fastened to another chain, rope or wire. An S link is provided on the other end to prevent the chain from becoming unthreaded. Chains in any length will be furnished on order.

Literature describing the Come-Along, instructions for its operation, and suggestions as to its many uses may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Renewable Points On Scarifier Teeth

New scarifier teeth with renewable points, designed for more effective work at lower maintenance costs, have been announced by the Caterpillar Tractor Co., Peoria, Ill., for all models of its Auto Patrols and almost all models of its blade graders.

These scarifiers have stronger shanks, tipped with points of special alloy steel. A hammer is all that is needed to put the points on or remove them, as a slight taper holds them firmly to the shanks. With this new arrangement, only the tips need to be renewed and, according to the manufacturer, these new tips last several times longer with one sharpening than the old ones.

Literature describing and illustrating these new scarifier teeth and tips may be secured by those interested direct from the Caterpillar Tractor Co.

New Conveyor Belt

A feature designed to withstand unusually severe service conditions has been embodied in the new conveyor belts made by the Mechanical Goods Division, U. S. Rubber Co., 1790 Broadway, New York City. This improvement consists in imbedding a special weave breaker-strip fabric in a heavy layer of soft white gum. This layer is inserted next to the belt carcass as an integral part of the belt cover, and provides a shock-absorbing cushion for the belt cover.

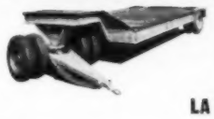
Because of its ability to absorb the shock of heavy impact, this new type of construction is claimed to increase the effectiveness of the cover in resisting gouging, snagging and other severe wear encountered in heavy service. In addition, extra protection is provided for the belt carcass due to the ability of this white breaker-insert to withstand and cushion the blows of heavy material, the manufacturer states.

Safety Code for Compressed Air Machinery and Tools

A safety code for compressed air machinery and equipment, drawn up and sponsored by the American Society of Safety Engineers, the Engineering Section of the National Safety Council and the American Society of Mechanical Engineers and approved by the American Standards Association, has just been published. The purpose of this code is to present a coordinated set of rules, the observance of which will insure reasonable safety for persons and property. It is hoped that it may serve as a guide to state authorities in the formulation of safety rules and regulations and that it will be adopted by manufacturers and users of compressed air equipment.

Copies of this code may be secured from The American Society of Mechanical Engineers, 29 West 39th Street, New York City. Price: 30 cents.

LA CROSSE Heavy Duty TRAILERS



The most complete line on the market. Capacities, five to two hundred tons. Four to sixteen wheels. Two to eight axles. They are built to take the heaviest loads safely, and with the least damage to road beds. Write today. Just tell us what you have to move.

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PULL SHOVELS •

Write for Bulletins describing the size of Marion in which you are particularly interested . . . and for a copy of the latest GROUNDHOG

C. & E. M. Photo
A Pneumatic-Tired Roller, Loaded with Sand, Compacted the Gravel Base.

Road Base Stabilized For Surface Treatment

(*Continued from page* 15)

tained by the contractor in a pit requiring a 4-mile dead haul but located centrally from the job. A Bucyrus-Erie ⅞-yard steam shovel and the Byers 66 were used in the gravel pit, loading 26 to 28 trucks of 1½-ton capacity, all of which hauled 4 cubic yards of gravel to the load as the truck owners were paid on a cubic-yard basis for each half-mile of haul. The contractor maintained the hauling road from the gravel pit in good condition so that the hauling was speeded. The gravel was dumped in windrows down the center of the road and spread with the motor patrol and rolled in 1,000-foot lengths with a Bros rubber-tired roller.

Since the satisfactory rolling of gravel requires a certain amount of moisture the contractor maintained a 1,000-gallon tank truck, a Mack, which sprinkled the surface whenever there was a dusty condition which of itself is not conducive to compaction. The tank was filled from a creek by a Gorman-Rupp 2-inch pump powered with a Wisconsin motor.

The base course consisted of two layers of clay-gravel spread in approximately 5-inch layers and stabilized with sand where necessary to reduce the clay content, then mixed and compacted to 4 inches. The base gravel required was 120 yards per station. The work started with 75 per cent clay-gravel and 25 per cent sand but tests of the materials changed the proportions to 79 per cent clay-gravel and 21 per cent sand.

The first base course was hauled in at the rate of 45 to 48 yards per station and dumped in a windrow down the center of the road and bladed out to 28 feet smooth and then the sand at 13 to 15 yards per station was hauled in and dumped on the gravel. The sand was loaded by hand to 3-yard trucks with five men to a truck from a deposit of fine sand 12 feet deep. The deposit was at the site of an early Indian village which was allegedly visited by DeSoto in 1540. The two shovel gangs and the foreman found many pieces of Indian pottery and some bones but nothing of any value.

As soon as the sand had been dumped on the 28-foot spread of gravel, it was bladed out to the same width as the gravel with an Adams leaning-wheel grader with a 10-foot blade and pulled by an A-C Model K tractor. The mixing of the sand and gravel was done with an Athens 16-disk harrow pulled by one of the A-C SO tractors. This disk harrow has Timken bearings, making it easy on the drawbar pull, particularly as the drawbar pulls at axle height of the harrow. The disks are 24 inches diameter, are serrated and also have disk cleaners. The leaning-wheel grader was also used to cut the material from side to side so that the plow could work most effectively. The disks mix mostly vertically so that the back and forth action of the blade was very helpful in lateral mixing.

When the first base course was thoroughly mixed it was allowed to be compacted under traffic supplemented with the roller so as to be reasonably uniform but not thoroughly compacted. It was watered as required to aid compaction. The second base course was spread with the sand and the gravel in exactly the same manner as the first except that the disking was carried deeper so that it took in about 1 inch of the bottom course, while in the disking of the bottom course the mixing was carried to within 1 inch of the subgrade so as not to incorporate any of the subgrade material in the base.

In pulling the disks through the sand and gravel for mixing they were set so that the front disks threw the material toward the outside and the second gangs pulled it in toward the center. The four gangs of disks were adjustable laterally as well as forward and backward. When the contractor felt that the material was completely mixed, the resident engineer had a trench cut across the road to check the mixing from top to bottom. This was done on both top and bottom courses of the base.

The gravel as removed from the pit ran about 20 to 30 per cent clay binder while the finished base with the addition of the sand contained from 12 to 17 per cent clay binder. Throughout the work of depositing the various materials on the road the contractor's dumper staked out the distance within which each truckload of material was to be dumped to insure the best possible blending of the required materials all along the job.

The entire base course was then spread to the full 28 feet and shaped, and then the 30-day maintenance period began, during which the base material gradually worked out to the full 30-foot width of the final roadway. During this time the contractor bladed the inslopes with a crawler tractor pulling the grader, as after the prime he could not run a tractor over the edge of the roadway.

Prime and Surfacing

At the end of the maintenance period on the base and just ahead of the prime the base was given a final blading in an interesting manner. The water wagon was run about 25 feet ahead of the motor patrol so as to make a slurry or "froth" 4 inches high ahead of the blade which would roll any small pieces of gravel along instead of scoring the surface. Also this method filled any previously scored spots with the fines and left a remarkably smooth surface for the prime. This surface also dried quickly.

The final base was checked with a 30-foot trussed template which was not too heavy to be handled by two men. It had a carpenter's level fixed to the center so that the men could be sure that it was level across the road. The tolerance permitted was from 1 to 1½ inches out of

(*Concluded on next page*)

STARTLING SAVINGS in Equipment Maintenance!

Contractors and Highway Departments report startling savings when Hypressure JENNY Steam Cleaning replaces old, slow, hand-cleaning methods. Now, cleaning of tractors, blades, rollers, hoisting engines, elevating graders, trucks, etc., takes only minutes instead of hours. Hypressure JENNY's more thorough cleaning permits closer inspection; helps keep your equipment on the job, and saves 25% to 40% of the mechanics' time on repair jobs. Find out what a real money-saver Hypressure JENNY can be for you. No obligation. Just mail the coupon for your free survey.

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- BINS, Portable and Stationary
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- CURB FORMS
- CURB AND GUTTER FORMS
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- SEWER AND TUNNEL FORMS
- CONCRETE BUCKETS
- SUBGRADE TESTERS
- SUBGRADE PLANERS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

● New Heltzel heavy duty steel forms for combined curb and gutter construction. Face form removed without disturbing front rail, back rail or division plates. Catalog S-20.

HELTZEL STEEL FORM & IRON CO.
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OWEN CLAMSHELL BUCKETS — MEASURE A BIGGER DAY'S WORK

A TYPE FOR EVERY DIGGING OR HANDLING NEED & A MOUTHFUL AT EVERY BITE

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For Recreation Or Relaxation Choose the Chelsea

FROM $6 WITH MEALS & BATH
$3 ROOM ONLY & BATH Per Person 2 in a Room

Here you will find everything to further your comfort and enjoyment—outside ocean-view rooms . . . sun deck . . . beautiful dining room at the ocean's edge . . . superb cuisine . . . varied sports . . . and entertainment. You'll like your fellow guests . . . and the delightfully friendly atmosphere of The Chelsea.

SPECIAL WEEKLY RATES

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W. G. Haden Co.'s Batching Plant for Truck-Mixed Concrete

Novel Batching Plant For Texas Contractor

Compactness and economy are the keynotes of a new composite truck-mixer loading plant recently furnished to the W. G. Haden Co., contractor, of Houston, Texas, by the Blaw-Knox Co., Pittsburgh, Pa. The design of the plant represents both a novel combination of equipment and original application to meet local conditions.

The circular storage bin is 22 feet in diameter and contains seven separate compartments, three of which are for cement, with two of 125-barrel and the third of 250-barrel capacity. Each of the four aggregate compartments holds 56 tons. Aggregates are loaded into the bin by means of a crawler crane with a clamshell bucket. Bulk cement is received in box cars and unloaded by screw feeder to the vertical bucket elevator shown in the illustration. The cement is distributed to the three compartments of the cement section by flop gates and chute.

The driveway for the contractor's Trukmixers and batch trucks is depressed into a tunnel beneath the plant in order to accommodate the overall height to the reach of the crane. The aggregate weighing batcher is of 2-cubic-yard size, equipped with a springless dial scale. The cement batcher is the same size but has a beam scale. Both batchers are manually operated, and the batcher operator is able to weigh out and load a complete 2-yard batch of cement and aggregates into one of the Trukmixers in less than a minute, it is reported.

Surface Treatment On Stabilized Base

(Continued from preceding page)

level across the road and ½ inch variation under the template. The contractor used this same template for the first and second base courses as well as the subgrade to be sure that the blading was not getting out of hand and distorting the road surface.

The true dry base was then cleaned of all surface material that was not well bonded by sweeping with a rotary broom and the dust blown off by a power blower. The tar prime was applied at the rate of 0.3 gallon per square yard and later sanded if necessary by hand casting with 10 pounds of sand per square yard to prevent picking up. The prime cured in from two to seven days.

Following this the work on the "mat" began. Asphalt was applied at from 275 to 300 degrees F. at the rate of 0.40 to 0.45 gallon per square yard and immediately covered with coarse slag from 1-inch down to ½-inch mesh and rolled with the Bros roller. This application amounted to not less than 0.5 cubic foot of the slag per square yard. Traffic was permitted to use the road for about three weeks before sealing. The loose material was removed by the rotary broom as soon as possible after the mat was placed, which was usually in about three days.

The seal consisted of 0.15 gallon per square yard of asphalt applied on the mat and covered with 0.25 cubic yard per square yard of slag from ⅜-inch down to 10-mesh sizes spread from a box attached to the back of the trucks and the material hand-broomed to insure complete coverage. The second or top shot consisted of 0.25 gallon per square yard so that the total for the two applications was between 0.42 to 0.45 gallon of asphalt. This was immediately broomed with a drag broom made of stable brooms mounted on a frame and pulled by a truck. Behind the brooms was hooked a clapboard drag to smooth off the surface which was then rolled and sanded with 5 to 7 pounds of sand per square yard and re-rolled lightly. This was kept closed to traffic about one day to prevent pick-up by passing cars.

Personnel

Federal-Aid Project 248C, consisting of the surface treatment of a stabilized gravel base on a stabilized subgrade, was awarded to S. R. Batson of Birmingham, Ala., on his low bid of $126,510.96. For the contractor, V. L. Taylor was Superintendent, and Randolph Rowe was Resident Engineer for the Alabama State Highway Department.

New Truck-Shovel

Traction on the ½-yard mobile truck shovel just announced by the Michigan Power Shovel Co., Benton Harbor, Mich., has been increased by the addition of a dual tandem-drive system. This new unit is quickly convertible from shovel to crane, dragline, clamshell or trench hoe.

Other features of this Model TMCT-16 are chassis stability, unusually low center of gravity, finger-tip air clutches, fast full-circle shovel swing, turntable hook rollers and all drum shafts mounted on ball bearings, and a full-vision roomy cab. High tensile alloy steel is used for the chassis. Westinghouse air brakes and 9.00-20 tires are standard on all wheels. Gasoline or diesel power is optional.

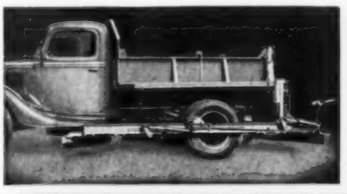
Bulletin C-205 giving full details on this new mobile unit may be secured direct from the manufacturer or from this magazine.

The New Michigan ½-Yard Truck Shovel

SPRING ROAD REBUILDING and SUMMER MAINTENANCE at Less Cost!

BURCH UNDR-TRUK ROAD MAINTAINER

Seven reversible blades on heavy steel frame. Any part of weight can be applied. Blades raise 8 inches for fast transportation. Attach in 3 minutes. Three sizes.

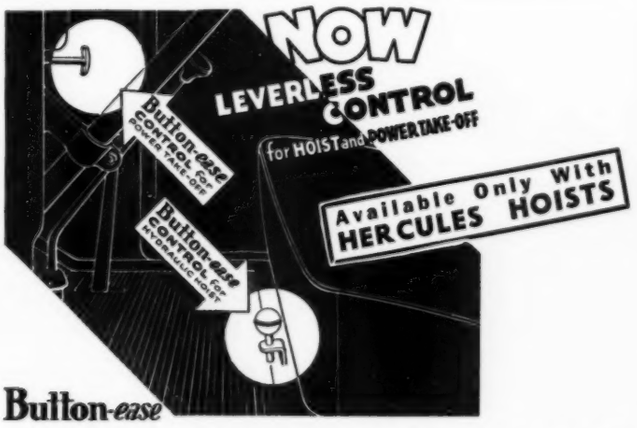


BURCH SHOULDER MAINTAINER

For clean, smooth shoulders. Fills ruts. Hydraulically controlled from cab. Adjustable—spread 6 to 12 inches. Attach with four "U" Bolts. Average cost per mile 15c.

Write for LITERATURE.

THE BURCH CORPORATION
CRESTLINE, OHIO



Control Eliminates Dump Body Levers in Truck Cab

HERCULES 5 EXCLUSIVE FEATURES

1. Tire-Tool Pack Dump Body.
2. Super-Power Center-Lift Hydraulic Hoist.
3. Ezy-Reach Tailgate Lever.
4. Button-ease control for Power Take-Off.
5. Button-ease control for Hydraulic Hoist.

Button-ease Control, on dash, operates Power Take-Off. Another Button-ease Control, on floor, operates Hydraulic Hoist. No mutilation of cab, floor or mat. Ideal for dump body installations on C. O. E. as well as standard models. No extra cost. Only Hercules can give you this "years ahead" engineering achievement. WRITE FOR LITERATURE.

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Standard for Half a Century-
TANDEM MODELS
From 2 to 21 Tons
Buffalo-Springfield
GASOLINE OR DIESEL POWERED
3 WHEEL MODELS
From 5 to 14 Tons
Full Details will be sent upon Request
3-AXLE TANDEM
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New A. E. D. Officers

The new officers of the Associated Equipment Distributors, elected at the Twentieth Annual Convention held last month in San Francisco, are: President, Victor L. Phillips, Victor L. Phillips Co., Kansas City, Mo.; First Vice President, R. R. Nixon, Nixon-Hasselle Co., Chattanooga, Tenn.; Second Vice President, William G. Morgan, Geo. F. Smith Co., St. Louis, Mo.; Secretary and Treasurer, A. C. Blaisdell, Blaisdell Equipment & Supply Co., Cincinnati, Ohio. A. F. Sersanous, Loggers & Contractors Machinery Co., Portland, Ore., was elected Chairman of the Board of Governors and the following were elected Directors: Arthur G. Wilson, Indiana Equipment Co., Indianapolis, Ind.; H. G. Ferris, Hofius-Ferris Equipment Co., Spokane, Wash.; Burton C. Dow, Dow & Co., Inc., Buffalo, N.Y.; Harry E. Shaw, Service Supply Co., Philadelphia, Pa.; E. P. Phillips, Phillips Machinery Co., Richmond, Va.; D. M. Edgerly, Interstate Machinery & Supply Co., Omaha, Nebr.; T. W. Harron, Harron, Rickard & McCone Co., San Francisco, Calif.; and E. A. Craven, E. F. Craven Co., Greensboro, N. C.

New Car Spotters

For economical and quick spotting of railroad cars for unloading, the Link-Belt Co., 2410 West 18th St., Chicago, Ill., has recently announced two new vertical-capstan electric car spotters, designated as No. 5-A and No. 10-A, respectively capable of 5,000-pound rope pull or moving one to three cars, and 10,000-pound rope pull or moving three to six cars, depending on conditions.

The new units employ a high torque electric motor, connected to the spotter drive mechanism by an encased flexible roller-chain coupling, and mounted with the spotter on a welded steel base plate. The vertical capstan, made of semi or cast steel, is machine finished. A sturdy housing completely encloses and protects the gearing. A ratchet and pawl are furnished when required, mounted inside the capstan, for holding cars on an incline when the power is off. The Model 5-A is equipped with a 5-hp motor and Model 10-A with a 10-hp motor.

Both of these new car spotters are described in Folder No. 1592, which may be secured direct from the manufacturer.

Improved Heavy-Duty Twin-Shaft Pug Mixer

The new Standard twin-shaft pug mixer, made by the Standard Steel Corp., 5001 So. Boyle Ave., Los Angeles, Calif., has been designed to give extra long life through the use of new special Meehanite metals and structural steel members, generous-sized shafts, extra wide gear faces and extra heavy wearing parts.

Standard mixers, built in nine sizes, have capacities ranging from 500 to 7,000 pounds, requiring an average horsepower for hot mixes of 10 to 140. Depending upon their size, the mixers have a running speed from 70 to 90 rpm with a peripheral speed of approximately 580 feet per minute at the paddle tip. The bottom-type discharge gates are adjustable to prevent leakage of aggregates or bitumens. The bearings have adjustable liners, are babbitted and bored to size. The arrangement and number of paddles are designed to prevent any segregation of materials and no accumulations can drop unmixed. The entire machine is sectionally designed and wearing parts can be quickly removed and replaced without dismantling other sections.

Bulletin No. 500, describing and illustrating these Standard pug mixers, may be secured direct from the manufacturer by mentioning this item.

ACTION! TRACTION!
TRUCK MOBILITY
REAL STABILITY
A high production machine on its own dual Tandem-Drive Michigan chassis. Saves time and money because it's quickly convertible to Crane, Clam, Dragline or Trench Hoe.
Write today for Bulletin C205
Tandem-Drive
TRUCK SHOVEL-CRANE
MICHIGAN POWER SHOVEL Co BENTON HARBOR, MICHIGAN, U.S.A.

PLUS IN VALUES
HEAVY DUTY TRAILERS
ROGERS BROTHERS
do one thing and do that well—build heavy duty trailers in a plant especially designed and equipped for this purpose.
Experience and facilities combine to give the purchaser of a Rogers Trailer the greatest all round value obtainable.
•EXPERIENCE built it •••
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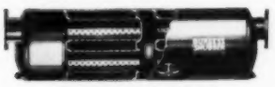


The Burgess Snubber

New Noise Snubber For Exhaust Gases

A totally new type of noise-quieting device that can be placed at any point in the intake or exhaust system of an engine or compressor has recently been announced by the Acoustic Division, Burgess Battery Co., 500 W. Huron St., Chicago, Ill. The name Burgess Snubber was chosen since the new device eliminates the cause of noise produced by the pulsating gases by snubbing the peak velocities and pressures, thereby producing a smooth flow of gas.

The operating principle of the Burgess exhaust snubber was evolved after long experimentation with various types of engines and research equipment, studying transient pressures and velocities within the exhaust manifolds of engines immediately after the opening of the exhaust valve. In this noise-reducing device the fast-moving slug of exhaust gas, which is vented into the exhaust system by the opening of the exhaust valve of the engine, is trapped in a high-resistance snubbing tube. This tube is perforated radially to allow the pent-up gas to vent gradually into the first snubber chamber. At the same time, a recoil pressure from the snubbing tube serves to slow up the flow of scavenged gases and thereby prevents pressure dropping below atmospheric pressure.

The slower moving scavenged gases do not enter the snubbing tube, but are diverted through a low-resistance exhaust tube in the first chamber. A second stage of snubbing, comparable to the first, removes any remaining impulses which may be present in the exhausted gases. Back pressures can be eliminated or controlled to any desired value.

The result of this snubber on the exhausted gases is much like that of braking an automobile to a gradual stop and thereby avoiding the noise of a crash with a stationary object by avoiding the crash itself. The same type of unit is applicable to intake and output lines of reciprocating and rotary compressors. These snubbers are available in a wide range of sizes for standard, heavy-duty, and spark-arresting service. A complete description and prices may be secured by writing to the Acoustic Division, Burgess Battery Co., and mentioning this item.

A.S.T.M. Cement Standards

The most recent edition of A. S. T. M. Standards on cement includes five specifications covering portland cement, high-early-strength portland cement, natural cement, masonry cement, and sieves for testing purposes. There are also given, in their latest approved form, the standardized methods of sampling and testing portland cement, chemical analysis of portland cement, compressive strength of portland-cement mortars, and fineness of portland cement by means of the turbidimeter.

Copies of this 107-page publication, prepared by Committee C-1 on cement, may be secured from the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Pa. Price: $1.00.

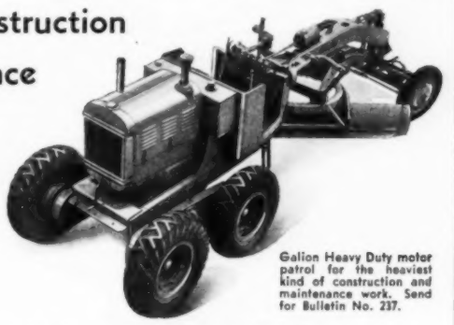
New Bulletins on Jacks

Two new bulletins, one describing Buda hydraulic jacks and the other devoted to Buda jacks for all types of construction work, have recently been issued by The Buda Co., Harvey, Ill. The line of hydraulic jacks includes eleven models to meet all lifting requirements from 1½ to 20 tons. Buda also makes a complete line of rugged heavy-duty jacks for all types of construction work, including automatic lowering jacks, all-purpose ratchet jacks, push and pull jacks, shoring and trench jacks and screw jacks.

Copies of these two new bulletins, No. 946 on hydraulic jacks and No. 949 on the other types, may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

For Spring Construction and Maintenance

USE GALION MOTOR PATROLS



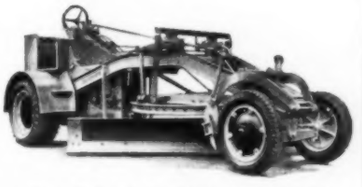
Galion Heavy Duty motor patrol for the heaviest kind of construction and maintenance work. Send for Bulletin No. 237.

Whether light or heavy construction—or maintenance—there is a Galion motor patrol grader to meet the requirement. A choice of weight, power, drive and special equipment . . . all types have hydraulic control.

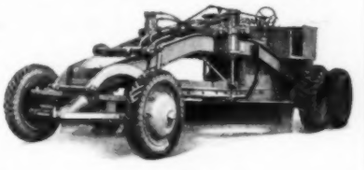
The Heavy Duty model has 66 H.P. diesel engine mounted over drive wheels, one-piece narrow frame, 3-passenger cab, full reversible blade and heavy duty transmission.

Master Models can be equipped with either diesel or gasoline engines, have double drive with four or eight wheels in rear. The Junior Patrol type is a lightweight unit in general use for light maintenance work.

Galion also builds pull graders in various sizes and weights, a full line of rollers, spreaders, sanders, etc. Let us send you complete details.



Above—Galion Junior Patrol with McCormick-Deering I-14 Industrial power unit. Below—Galion Master Model with double drive and diesel engine.



GALION ROAD MACHINERY

THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

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KINNEY DISTRIBUTORS have definite practical advantages

Famous Kinney standby features retained: Kinney jacketed pump—always reliable and accurate as a meter . . . efficient heating system with tubes low in the tank permits safe heating of as little as 1/5th of the capacity . . . Pump speed and fifth wheel tachometers for accurate application . . . Inside closing valve.

Ford 60-hp. V-8 engine provides surplus power and extreme flexibility. V-8 flexibility with two forward speeds makes it easier to maintain exact pump speeds required for various application requirements.

Low ratio 6.4:1 gives tremendous surplus of power for loading viscous or sticky, quick-breaking emulsions.

Reverse gear allows operator to pump most of the load back through the loading hose into bottom of a tank car to break up cold slugs. The suction is taken through the circulation line.

Air-Controlled, Instantaneous Operation from cab or rear platform. Quickest starting and stopping valves ever offered on a distributor! Turn one air cock and instantly close circulating line and start spraying—turn it back, get a clean stop with automatically cleaned spray lines. Air cocks—located in cab, or on rear platform, or both—operate two standard Westinghouse Air-Brake Type Controllers.

Bulletin A fully illustrates and describes Kinney Distributors—write for your copy.

KINNEY MANUFACTURING CO.
3531 Washington St., Boston, Mass.

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

—HAYCO—

THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

You remove dirt at *new low cost per yard —and make money*

with Heil *Dig-N-Carry* Hydraulic Scrapers

Two model RS-3 Heil Dig-N-Carry Scrapers in the service of Wm. Lathers, Jr., Reedsburg, Wis.

Real savings in time and service expense . . . clean-cut, on-time jobs that bring repeat business—that's what you get when you depend on Heil Hydraulic Scrapers. The Dig-N-Carry hydraulic system gives you simple, positive control of all operations . . . does away with the shortcomings of mechanical control. Long-life service features bring low costs per yard for digging, hauling, dumping, spreading. Follow the example of many successful dirt-moving contractors—use Heil Hydraulic Scrapers. Write, wire or phone today for information. Or, see your nearest Heil representative.

HEIL Quality PRODUCTS

HOISTS - BODIES - TANKS
ROAD SCRAPERS - SNOW PLOWS
BOTTLE WASHERS - DEHYDRATORS
OIL BURNERS - WATER SYSTEMS

MILWAUKEE, WISCONSIN — THE HEIL CO. — HILLSIDE, NEW JERSEY

Check-Ups Improve Engine Performance

(*Continued from page 12*)

The large operator should employ a capable, trained carburetor man. This man should be supplied with sufficient test equipment to do a thorough job. The major piece of test equipment is a stand for testing float levels. Many shops check float levels with washing solutions in place of gasoline. There is, of course, the fire hazard of using gasoline for this work but the difference in specific gravity between a washing solution and volatile gasolines may make a large difference in float levels. It is also well to remember that gasoline cannot be used again and again, day after day, and give correct float-level readings. Each time the gasoline is aerated by being pumped into the carburetor and then drained back into the supply tank it loses a small part of its more volatile fractions until it, too, will give a false float-level reading. Each day should be started off with fresh gasoline taken from the main supply tanks. If non-inflammable solutions must be used in order to abide by fire rules, then care must be exercised to use a solution of the same specific gravity at all times and a careful calibration made so that the float level, when set with one of these solutions, will be correct when gasoline is used.

When checking float levels it is always advisable to subject the float mechanism to at least a quarter-pound higher pressure than is being maintained at the fuel pump of the engine on which the carburetor is installed. Float levels should be set to manufacturer's specifications, preferably keeping the level on the low side and at no time allowing it to reach the high side of the specification.

The Air-Fuel Ratio

It is difficult to judge accurately the proper idle air-fuel ratio of an engine. Many commercial engines will idle satisfactorily from a very rich to a rather lean mixture. For greatest economy it is desirable to work as near to the lean as possible and still obtain a non-stalling idle and a satisfactory cross-over from the idle position. The use of a vacuum gage is desirable but it is possible, with the use of the gage alone, to obtain an idle on the rich side. Therefore, the use of exhaust gas analysis as a means of properly setting the idle is advised. It, of course, requires time to set an idle properly by this means, yet the savings effected, first by proper float levels and second by correct idle air-fuel ratios, will more than compensate for the time spent.

The Fuel Pump

The ability of the fuel pump to work reasonably well day after day is probably the reason it receives so little attention. Fuel-pump condition and vapor-lock complaints travel almost hand in hand. Experience has shown that fuel pumps which are up to maximum operating efficiency will eliminate the majority of vapor-lock complaints. Fuel pumps are not difficult to test while installed on the engine. The use of a pressure gage and a pint measure to check capacity against time is all that is necessary. Many operators have provided a convenient tee or pet cock in the line so that the fuel-pump test equipment can be quickly installed during the routine inspection periods.

Ignition System

Perhaps the next most neglected item on an engine is the ignition system. This system has as much to do with good gasoline averages as has the carburetor condition. Most distributors have the breaker points checked during routine inspection periods but very few are removed and the automatic advance and vacuum advance checked at periods of 10,000 to 20,000 miles. The vacuum and automatic advance mechanism of a distributor can change considerably and these advance curves should be checked to give best operation and fuel economy. For this reason a distributor test stand is most desirable, since the cam angle or distributor point opening can be accurately checked, as well as the automatic advance.

Not enough attention has been paid to the very important item of setting the ignition timing correctly. On this matter the manufacturer is equally to blame with the operator by sometimes not providing easily accessible timing marks. The use of a spark gap or a Neon flasher light is recommended and timing should be set with the engine in motion so as to offset any looseness in the drive system

(*Continued on next page*)

Aeroil OIL BURNING CONTRACTORS' EQUIPMENT
• KETTLES FOR TAR, PITCH & ASPHALT • EMULSION DISTRIBUTORS • POWER SPRAYS • LEAD MELTING FURNACES • WEED BURNERS • TORCHES & BURNERS
Send for *FREE* Bulletin No. 100-C
Aeroil Burner Co., Inc.
West New York, New Jersey
Chicago San Francisco Dallas

Blaw-Knox BULK CEMENT PLANTS are the ultimate in portability, speed, and convenience of use and operation. They are *complete units* for unloading, storage, batching and handling of bulk cement—dependable and accurate.
Completely described in Blaw-Knox Catalog No. 1566. Send for copy.
21
BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.
Bulk Cement Plants

Only Blaw-Knox Batcherplants have hinged legs—a real feature for portability.
When leaving the job—fold up the legs, lower the bin onto a truck or car, and move. No need to dismantle the Weighing Batcher, the entire plant is an integral unit. Setting up the bin is just as easy. They are shipped from the factory that way.
See these interesting plants in Blaw-Knox Catalog No. 1566.
13
BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.
PORTABLE BATCHERPLANTS

IT'S YOUR OLD FRIEND
NOVO DIAPHRAGM PUMP
A new, light-weight, compact design for the old dependable diaphragm pump. The ideal seepage and "drying-up" pump.
YOU KNOW—that the diaphragm pump handles more debris and dirtier water than other pumps as well as more air and always holds its prime.
—that there are jobs where the diaphragm pump is the only answer.
—that you have wanted the diaphragm pump simplicity in a light-weight, portable pump.
HERE'S YOUR ANSWER—A Novo Diaphragm Pump that combines the old Novo Diaphragm Pump dependability with portability and ease in handling.
PRICES on these pumps will surprise you—send for them.
NOVO ENGINE CO., 218 PORTER ST., LANSING, MICH.
Send me full information on these new, light-weight, portable diaphragm pumps.
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Address_____
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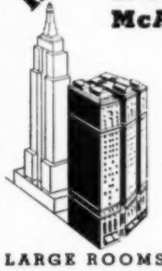
NOVO ENGINE CO.
LANSING, MICHIGAN

IN NEW YORK
HOTEL McALPIN

"A GREAT HOTEL"
LARGE ROOMS, NEWLY FURNISHED & DECORATED
SINGLE from $3.00
DOUBLE from $4.50
1 BLOCK FROM PENN. STATION
B. & O. Motor Coaches stop at our door.
SPECIAL FLOOR DEVOTED TO WOMEN GUESTS EXCLUSIVELY
HOTEL McALPIN
BROADWAY AT 34th ST., NEW YORK
Under KNOTT Mgt. John J. Woelfle, Mgr.

Good Engines Deserve Good Care, Good Fuel

(Continued from preceding page)

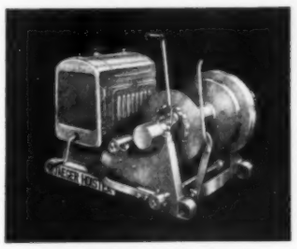
between the crankshaft and the distributor. Generally, it is advisable to paint the timing marks with white paint so they will be easily visible. If and when the manufacturer does not provide proper timing facilities, the operator will be repaid many times for the time and expense involved to provide some easily accessible means of timing. Inspection crews and mechanics are much more likely to check timing if accessible means are available.

Spark plugs should be inspected and reset frequently. Maximum mileage without inspection should not exceed 5,000 miles or each 120 hours. The cleaning by sand blasting of spark plugs is perhaps desirable but coarse abrasives should be avoided. Spark plugs should be carefully cleaned with compressed air after sand blasting so as to remove any of the remaining cleaning medium. The life of a spark plug can be increased and greater engine efficiency insured by having one man responsible for spark plug inspection and replacement. There are a number of fleets throughout the country who have their own men remove spark plugs and turn them in to the electrical department. Either new or cleaned and adjusted spark plugs are drawn out and installed in the engine. At frequent intervals during the week the used plugs are cleaned, regapped, and tested. Those plugs that are too badly worn are thrown out and new plugs drawn out of stock to replace them. This procedure, in almost every instance, has resulted in increased spark-plug life and less failures attributable to spark plugs.

Conclusion

It is well to stress again the need for understanding the equipment which is being used and devotion of time to details which seem rather small. However, it has been illustrated that attention to these very details can increase the fleet average from 3 to 5 per cent without any recalibration of carburetors or changing of equipment from its original standards.

Want information? Write the Editor.



The Model A Dixie Hoist

New Special Hoist

In the new Model A Dixie Special hoist recently announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio, application of power to the drums is through a specially designed ball-bearing screw thrust acting on double cone frictions of molded copper inserts and asbestos type. A forward movement of the lever engages the two cone frictions of clutches. A return pull on the lever automatically frees them. The side frame and base of this 17 to 36-hp hoist is one compact integral all-steel unit which the manufacturer states is stronger and lighter in weight than conventional models. Using the single drum hoist as a base unit, a second drum may be bolted on.

The Jaeger line of hoists consists of five basic types, ranging from 6 to 100 hp. Base, frames, drums, pawls and frictions are the same in all sizes of a given type, only the engine being changed to meet various requirements.

New Portable Asphalt Plant

The new Hetherington & Berner Model P-A asphalt mixing plant, which combines portability and capacity, is described in detail in a new Bulletin T-260, copies of which Hetherington & Berner, Inc., Indianapolis, Ind., will be glad to send on request.

Interest in Superhighways

There seems to be a wide public interest, stimulated no doubt by the reports of Germany's and Italy's superhighways, in the creation in this country of a system of multiple-lane highways, built according to the highest standards of grade and alignment, with opposing traffic separated by a center parkway, bypassing all cities, with structures separating streams of traffic at all highway and railroad crossings, and with access from side roads only at selected and infrequent points.

The large volumes of traffic flowing between densely populated areas, when not too widely separated, in many instances appear to justify the high cost of such improvement. The U. S. Bureau of Public Roads is now making studies as directed in the Federal-Aid Highway Act of 1938 that should indicate rather definitely the need for such highways and their feasibility.

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D-K SPREADER
AND FINISHING MACHINE AND BITUMINOUS PAVER

- Lays any type mix, hot or cold
- Lays any thickness desired
- Levels without forms
- Capacity 1000 to 1200 tons per day
- Lays variable widths from 6' to 10'
- Lays to grade

No high or low spots when re-surfacing with a D-K Spreader

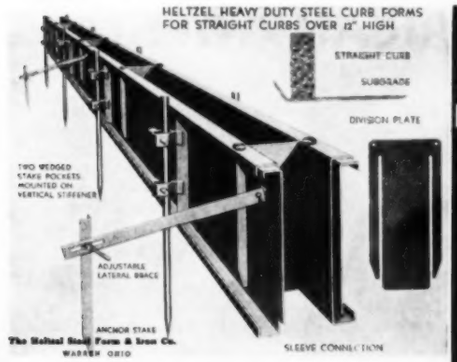
Spreads and automatically grades in one operation

Finishes without forms or manual labor

LAYS SMOOTHER ROADS, FASTER AND CHEAPER

Inquiries solicited—Circulars furnished upon request. Address Dept. CE

THE SHUNK MFG. COMPANY
BUCYRUS, OHIO, U. S. A.


HELTZEL HEAVY DUTY STEEL CURB FORMS FOR STRAIGHT CURBS OVER 12" HIGH
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SUBGRADE
DIVISION PLATE
TWO WEDGED STAKE POCKETS MOUNTED ON VERTICAL STIFFENER
ADJUSTABLE LATERAL BRACE
ANCHOR STAKE
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BUILDS IT BETTER

- BINS, Portable and Stationary
- CEMENT BINS, Portable and Stationary
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- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
- CURB AND GUTTER FORMS
- SIDEWALK FORMS
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● Heltzel heavy duty steel forms for straight curbs. Vertical stiffeners and lateral braces insure positive rigidity. Catalog S-20

HELTZEL STEEL FORM & IRON CO.
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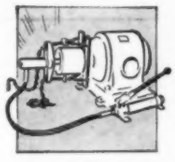
BLACKHAWK

World's Largest Manufacturer of HYDRAULIC JACKS Gives Construction 3 BIG IDEAS!



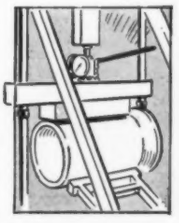
Pulling pulley off motor shaft—just one of many maintenance jobs Porto-Power does quicker and better.

1. All-Directional Hydraulic Power with Porto-Power

Dependable power to push, pull, lift, bend, press, clamp and spread in 10-ton, 20-ton and 50-ton capacities. Porto-Power operates with smooth, hydraulic power in any *position* — upright, inverted or at any angle.

Because of remote control feature (pump separated from ram by high-pressure hose) Porto-Power is lightweight, portable, safe—works where mechanical or ordinary hydraulic jacks fail. One man can carry, position and operate Porto-Power on any job — anywhere!

2. Blackhawk Gauge-Equipped Hydraulic Jacks for Handier Testing



Full range of Blackhawk gauge-equipped hydraulic jacks (7 to 75 tons), offer the most practical, economical testing equipment available. The answer for testing concrete pipe, concrete beams, springs, re-arching springs, general press work, sinking piles to predetermined loads, checking steel section weights. Offer double utility — may be used as ordinary jacks in addition to testing.

3. Blackhawk Hydraulic Jacks Multiply Man-power . . . Greater Efficiency on Lifting Jobs

Compare the 94% operating efficiency of Blackhawk hydraulics with the 12% to 30% efficiency of average screw jacks — and you'll agree that there's nothing to match Blackhawk Hydraulic Jacks for multiplying man-power. There's a hydraulic jack to meet your every need in Blackhawk's complete line — 1 to 75 tons. Light weight — attractively priced. BUY NOW!

MODEL EA11 — 20 TONS. Weighs only 40½ lbs. Users net $35.00. (Slightly higher in West and Canada).

A Product of **BLACKHAWK MFG. CO., Dept. J1849, Milwaukee**

BLACKHAWK MFG. CO., Dept. J1849, Milwaukee, Wis.
Send file of 1939 catalogs showing Blackhawk Products and their many uses in construction.

Name.....

Company.....

Address.....

C. & E. M. Photo
The Concreting Plant of the Lane Construction Corp. for Bridge Piers near Plymouth, N. H.

Novel Concreting for Bridge-Overpass Pier

(*Continued from page* 25)

Sure-Prime pump that was primed at the start of the job and then handled its own prime thereafter.

The foundation of the pier is 100 untreated wood piles with 8-inch tips and 12-inch butts driven with an average penetration of 15 feet by the same steam hammer. After cutting off the piles, a 4-foot reinforced concrete footing was poured 21 x 42 feet to carry the shaft. The orginal plan was to riprap the space between the sheeting and the footing and then pull the sheeting. But the penetration of the piles was not as great as expected and to guard against scour the steel sheeting was driven as far as possible, cut off at the elevation of the river bed, back-filled with gravel to within one foot of the top of the sheeting and sealed with a foot of concrete. During this operation the water in the river rose more than expected, following a series of heavy rains in the district, so a 2-foot high dike was quickly thrown up around the footing as shown on page 25.

Forms for the Center Pier

The center pier is 11 feet thick at the bottom and 37 feet long, with semi-circular noses up and downstream. The sides and downstream nose are battered ½ inch per foot and the upstream nose 2 inches per foot. The side forms were ¾-inch regular plywood waterproofed and oiled, set with 2 x 6-inch studs on 16-inch centers and wales of double 2 x 6's on 2-foot 6-inch centers tied with Richmond Tyscrus with ½-inch rods.

The nose forms were made up with ribs band-sawed on the job cut from 2 x 8's and spaced 15 inches on centers. These ribs were lagged with ¾-inch sheeting faced with ¼-inch plywood. The vertical wales were double 2 x 6's with miscellaneous spacing to fit the ribs.

Concreting Plant

The concrete plant was set up on the shore on the Plymouth side fully 35 feet above the water and approximately 60 feet from the shore. Sand and crushed gravel were dumped in separate stockpiles at the north end of the old bridge and were moved to the mixer in wheelbarrows. Six men shoveled stone while three men wheeled, and two men shoveled sand while two others wheeled. All wheelbarrow loads were weighed on Fairbanks platform scales, there being separate ones for stone and sand. Heavy plank runways were laid over the ground to the mixer platform which was supported on 50-foot piles and 8 x 8 and 10 x 10 stringers on 10 x 10 caps with two bents of the timber piles and one of 8 x 8 timber. There were two cement men, one mixer man and a foreman at the Jaeger 2-bag mixer which was equipped with a skip shaker and driven by a Hercules engine.

The mixed concrete was delivered to a wooden chute lined with sheet metal and about 60 feet in length leading to a hopper at the bottom at the elevation of the crane trestle. A gate in the side of the hopper permitted loading a Blaw-Knox roller-gate bucket of one-cubic-yard capacity swung by the Bucyrus-Erie crane. One man at the bottom handled the loading of the bucket.

Water for the mixer and for the steam crane was supplied by a Novo pump, powered by a LeRoi engine, on the north bank of the river. As the elevation of the crane above the river was only a few feet, little advantage was taken of the pumped supply but instead the crane siphoned its own supply direct from the river, using the other for emergency.

The outfit described poured as much as 135 cubic yards of concrete in 12½ hours with two men on the pier to receive the bucket and puddle the concrete with their feet. No vibration was used for placing the concrete and no honeycomb was found when the forms were stripped. There were four carpenters and two steel men on the job.

Personnel

The contract for the construction of the overpass on U. S. 3 between Plymouth and Ashland, N. H., was awarded to the Lane Construction Corp. of Meriden, Conn., on its low bid of $203,245.36. All substructure work and the approaches were built by Lane, with the steel work being furnished and erected by the American Bridge Co. Harold F. Hayden was Superintendent for the contractor on road work and E. Rex Murphy was Bridge Superintendent. For the New Hampshire Highway Department, H. L. "Cap" Thurston was Resident Engineer, assisted by Roger H. Downing.

New Electric Hammer

The Black & Decker No. 34 portable electric hammer has been redesigned to increase the motor power and efficiency in order to provide faster drilling ability and to increase the life of moving parts, according to a recent announcement from the Black & Decker Mfg. Co., Towson, Md. This tool, like all Black & Decker portable electric hammers, is a completely self-contained unit powered by a universal motor and requires no transformer, rectifier or other extra equipment. There has been no change in the operating principle of the tool, the action being developed by an oscillating weight and spring assembly, the weight driven indirectly by a crank. The motor is mounted at right angles to the barrel and operates through a train of reducing gears.

Complete information on this new tool, which weighs only 17 pounds, develops 2,300 blows a minute and has a capacity in concrete or brick of 1⅛ inches, may be secured direct from the manufacturer by mentioning this magazine.

Falling Platform Hits Man

As sacked cement was being loaded on a truck, one tier of bags remained on the edge of the platform, causing it to tip. Falling planks fractured the skull of a worker. The moral to that tale is, of course, that if the platform had been securely fastened to its pile supports, this would not have happened.

Cranes Take Fast, Hefty Swings with a Williams Bucket on the Boom!

★A tricky fight manager once stuffed a lot of horseshoes into his fighter's gloves. But he overloaded them so the poor pug could barely lift his hands—and was an easy knockout. *Don't handicap your cranes the same way!*

● Cranes have limits in lifting power and digging radius. Hanging *too* big a bucket on the boom often defeats its own purpose!

You want *fast* digging, and *big* payloads—and Williams Buckets help you get the best performance from your cranes because Williams welded construction and design eliminate excess weight without sacrificing digging power or durability! You get the most out of your cranes with the right Williams Bucket on the boom or dragline!

★Send for free bulletins covering the Williams line of Power-Arm, Multiple-Rope, Power-Wheel, Hook-On and Dragline Buckets. Distributors located in all parts of the country for prompt field service.

THE WELLMAN ENGINEERING CO.
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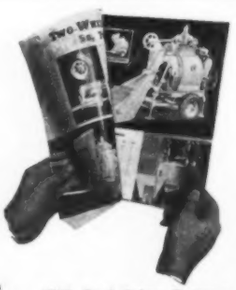
***built by* WELLMAN**

AMERICA'S NO. 1 EQUIPMENT LINE!

NEW CATALOG NOW READY!

Packed with illustrations and information on the greatest line of profit making equipment in CMC's history. Write for your copy.



New CMC End Discharge 3½ Non-Tilt. Also 3½ End and Side Discharge Tilters.

CMC Dual Prime Pumps—a complete line from 1¼" to 10"—Doubly fast priming — proven stamina — efficient—economical.

CMC offers the last word in modernized Mixers, Plaster and Mortar Mixers, Bituminous Mixers—Dual Prime Pumps, Hoists, Saw Rigs, Carts and Wheelbarrows.

CMC Non-Tilt Trailers in 5s, 7s, 10s and 14s sizes. Big output with fastest handling ease.

CONSTRUCTION MACHINERY COMPANY, WATERLOO, IOWA

THE AMERICAN GOPHER

CRANE • SHOVEL • DRAGLINE

SPEED AND EASE OF HANDLING AND PHENOMENAL RUGGEDNESS . . INSURE THE PAY-OFF.

½ YARD
¾ YARD
1 YARD
1¼ YARD
1½ YARD
1¾ YARD
2 YARD

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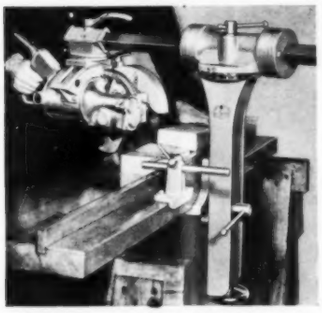

The New Power King Multisaw Arm

Handling Reinforcing Feature of Siphon Job

(Continued from page 27)

a Victor acetylene outfit, was used in the field for numerous welding jobs.

Major Quantities

The major quantities for the job were as follows:

Common Excavation

For structure, except siphon barrel	3,690 cu. yd.
For siphon barrel	117,469 cu. yd.
For canal	26,692 cu. yd.

Rock Excavation

Structure, except siphon barrel	819 cu. yd.
For siphon barrel	150 cu. yd.
For canal	368 cu. yd.
Compacted embankment	82,745 cu. yd.
Compacted lining	26,372 cu. yd.
Riprap on outside embankment slopes	19,840 cu. yd.
Rock fill about siphon	33,079 cu. yd.
Backfill about structure, except over siphon barrel	2,198 cu. yd.
Backfill over siphon barrel	54,000 cu. yd.
Compacted backfill	1,033 cu. yd.
Concrete in structure, except siphon barrel	1,166 cu. yd.
Concrete in siphon barrel	10,441 cu. yd.
Reinforcing	2,462,991 lb.
Steel sheet piling	1,726,113 lb.
Fixed wheel gate, gate frame, gate & counterweight guides, and counterweight hangers	58,660 lb.
Fixed wheel gate hoist and operating mechanism	20,691 lb.
Miscellaneous metal work	1,979 lb.
Electrical metal conduits	170 lin. ft.
Electrical conductors	9 lb.
Rubber water stops	150 lin. ft.
Elastic joint filler materials	242 sq. ft.
Overhaul (over 200 feet) Station-cubic yards	95,667

Personnel

The Metropolitan Construction Co. of Los Angeles, contractor for this job, employed about 130 men, with Joseph Muscolo as Construction Superintendent. Leo J. Foster is Construction Engineer for the U. S. Bureau of Reclamation on both the All-American Canal and Gila Projects, with W. A. Brenner Engineer in Charge for the Bureau on the Gila work.

New Multisaw Arm

The new multisaw arm recently announced by the Power King Tool Corp., Warsaw, Ind., is the first step in its new product program for 1939. This new arm is rigid, accurate, easy to set up, easy to operate, and easy to move about the job or workshop. It will cross cut, rip, mitre, bevel, bevel rip, etc. Equipped with an abrasive disc, it will cut or score brick, stone, slate, marble and similar materials.

The slide bar rides smoothly on eight sealed ball bearings and has a 28-inch stroke. The swivelling head is graduated for accurate mitre cuts, and the saw elevation is adjustable up to 9 inches. Any Power King saw, 8 to 11-inch inclusive, can be used with this new multisaw arm.

A descriptive bulletin on this new product as well as information on the complete line of Power King saws may be secured direct from the manufacturer by mentioning this magazine.

Increased Power for Elevating Graders

The Caterpillar diesel No. 48 elevating grader is now powered with a 6-cylinder 66-hp diesel engine, replacing the 4-cylinder 46-hp engine previously used, according to a recent announcement by the Caterpillar Tractor Co., Peoria, Ill. This larger engine provides greater power for driving the carrier belt, resulting in increased capacity for loading or casting dirt.

Other refinements and improvements have been made on all models of Caterpillar elevating graders. An arched plow beam has been provided, permitting rubbish or heavy sod to pass under the beam without clogging. All models also feature an improved drawbar arrangement with a downward pull on the plow beam, providing maximum penetration in hard soils. The upper carrier lift chains have been replaced with cables, which pass around larger drums, to give faster carrier lift and add flexibility to the machines.

Tar and Asphalt Kettles

The features of the Littleford 84-HD tar and asphalt kettle for maintenance jobs, including double-heat circulation, a screened reservoir and a hand or motor spray attachment, are described in literature issued by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio. Copies may be secured by state and county highway engineers and contractors direct from the manufacturer.

1 UNION METAL
Steel Monotube Pile
Supports 100-Ton Load

● Now you can cut foundation costs with safety! Evidence of Fluted Monotube Pile's greater load-supporting value is found in such impartially-conducted load tests as pictured above. One long, steel Monotube Pile can be driven to depths in high load-sustaining soil strata (filled with concrete after driving) to develop a load-supporting value of 40, 60 or even 80 tons with ample factor of safety. Compare this with the 15, 20 and 30-ton ratings for wood and all-concrete piles and you have the answer to Monotube's greater efficiency and economy. Write for catalog No. 68 today.

THE UNION METAL MANUFACTURING CO.
CANTON, OHIO

...For clean cutting jobs!

SILVER KING
HIGHWAY MOWER

When this efficient mower comes down the road it leaves a smooth, even path in its track. No re-cutting. The first time over lasts longer because of the close cutting job it does. If you're responsible for purchasing highway mower equipment, by all means send for the free folder illustrated below. You owe it to yourself to see what a truly great mower the Silver King is.

★

THE FATE-ROOT-HEATH COMPANY
PLYMOUTH, OHIO

Send for this FREE FOLDER!

ASPHALT PLANTS

HOT & COLD MIX – ANY CAPACITY
PORTABLE OR STATIONARY
STEAM – ELECTRIC OR DIESEL

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CHATTANOOGA, TENNESSEE

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470 Fourth Avenue, New York

Enclosed is my remittance of $2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

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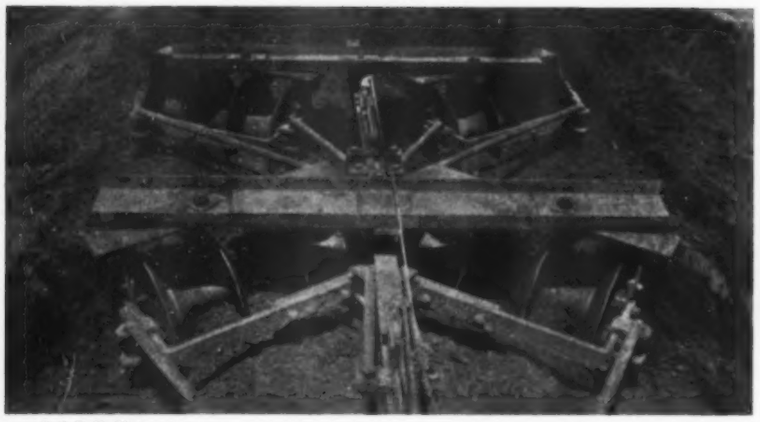
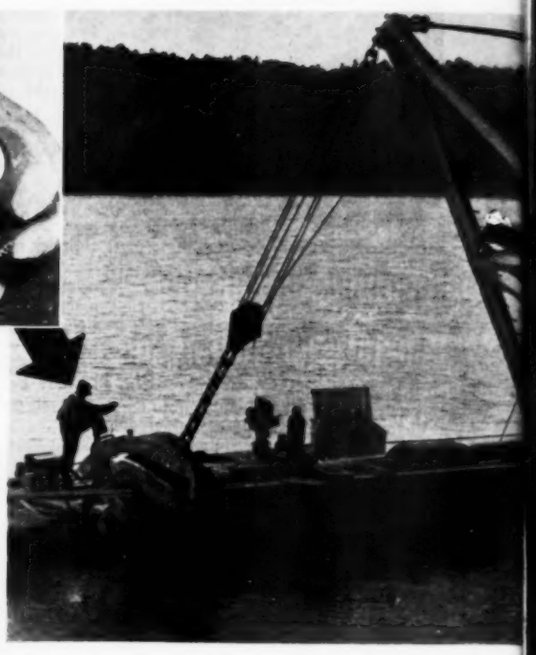
Contractors and Engineers Monthly

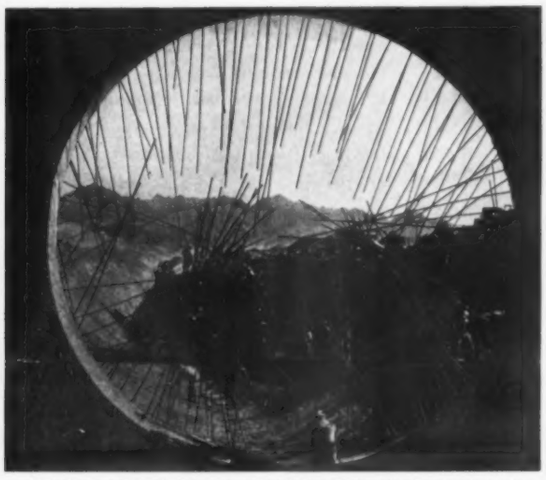


C. & E. M. Photo

The Tractor Operator's View of the Disk Harrow Mixing Sand and Gravel for Stabilized Base On the Batson Contract Between Harpersville and Childersburg, Ala. See Page 15.

The Abrasion To Which The Cutter Heads of Dredges Are Subjected May Be Offset by Hard-Facing. The Life of This Dredging Cutter Was Increased from Six Weeks to Ten Months by This Method. See Page 31.



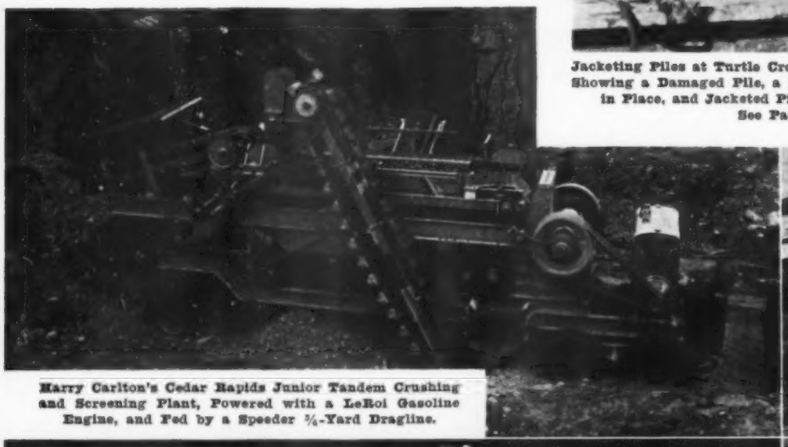


Work on a Monolithic Concrete Siphon Under the Dry Bed of the Gila River on the Gila Project in Arizona, As Seen from the Inside of the Inlet Closed Transition. See Page 8.

Jacketing Piles at Turtle Creek Bridge, Brunswick, Ga., Showing a Damaged Pile, a Pile with the Jacket Form in Place, and Jacketed Piles in the Background. See Page 2.

C. & E. M. Photo

A Georgia State Highway Maintenance Crew Getting Ready for Crack Filling in Division 6 Near Darien. See Page 7.



Harry Carlton's Cedar Rapids Junior Tandem Crushing and Screening Plant, Powered with a LeRoi Gasoline Engine, and Fed by a Speeder ¾-Yard Dragline.

On This Road Job of N. M. Ball Sons in California, Most of the 526,000 Cubic Yards of Excavation Was Handled by Carryalls Pulled by Caterpillars.

Aided by a Blaw-Knox Finisher Which Lights Its Own Way, the Wayne Paving Co. Worked Day and Night to Finish This Asphalt Pavement in Benton Harbor, Mich.

Laying Bituminous Macadam Wearing Surface on the Binder Course Near the Administration Building at the New York World's Fair. See Page 2.